SECTION 1

DRAFT REPORT - TOWNSHEND DAM EXPLORATION PROGRAM

TOWNSHEND DAM

TOWNSHEND, VT

Contract No. DACW33-93-D-0004

Contracting/Ordering Officer:

Charles W. Coe

Delivery Order No. 0010

PREPARED FOR: U.S. Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham, MA 02254-9149

PREPARED BY: Atlantic Testing Laboratories, Limited
P.O. Box 29
Canton, NY 13617

ATL REPORT NO. CD0047-1-9-94

OCTOBER 6, 1994

SECTION 2

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SECTION 2

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SECTION 3

SCOPE OF INVESTIGATION

a. Delivery Order No. 0010

ORDER FOR SUPPLIES OR SERVICES

(Contractor must submit four copies of Invoice)

Contract Folder CD 9/1/94

Form Approved OMB No. 0704-0187 Expires Aug 31, 1992

1. CONTRACT/PURCH ORDER NO.	2. DELIVERY ORDER NO.	3. DATE OF ORDER.	4. REQUISITION/PURCH REQUEST NO.	5. PRIORITY
DACW33-93-D-0004	0010	08/29/94	961316-4229-0007	

6. ISSUED BY CODE 961316
DEPT. OF THE ARMY
N. E. DIVISION, CORPS OF ENGRS
424 TRAPELO ROAD
WALTHAM MA 02254-9149
Dorothy Moebius S01 (617) 647-8419

7. ADMINISTERED BY CODE EMPTY

8. DELIVERY FOB
[ ] DEST
[X] OTHER
(See Schedule)

9. CONTRACTOR Vendor Id: 00001586 CODE 0GKT9 FACILITY CODE

NAME AND ADDRESS
ATLANTIC TESTING LAB, LIMITED
P.O. BOX 29
CANTON NY 13617

10. DELIVER TO FOB POINT BY 11/04/94

11. MARK IF BUS. IS
[ ] SMALL
[ ] SMALL DISAD-VANTAGED
[ ] WOMEN-OWNED

12. DISCOUNT TERMS 0% 00 Days Net 030

13. MAIL INVOICES TO See Block 15

14. SHIP TO CODE GEB
GEOTECHNICAL ENGINEERING
DIVISION, ENGINEERING
DIRECTORATE AT ISSUING OFFICE
DACW3393D0004 /0010

15. PAYMENT WILL BE MADE BY CODE FAO
FINANCE & ACCOUNTING OFFICER
U.S.A. ENGR. DIV., NEW ENGLAND
424 TRAPELO ROAD
WALTHAM MA 02254-9149

MARK ALL PACKAGES AND PAPERS WITH CONTRACT OR ORDER NUMBER

16. DELIVERY [X] This delivery order is issued on another Government agency or in accordance with and subject to terms and conditions of above numbered contract.

PURCHASE [ ] Reference your furnish the following on terms specified herein.

ACCEPTANCE. THE CONTRACTOR HEREBY ACCEPTS THE OFFER REPRESENTED BY THE NUMBERED PURCHASE ORDER AS IT MAY PREVIOUSLY HAVE BEEN OR IS NOW MODIFIED, SUBJECT TO ALL OF THE TERMS AND CONDITIONS SET FORTH, AND AGREES TO PERFORM THE SAME.

NAME OF CONTRACTOR	SIGNATURE	TYPED NAME AND TITLE	DATE SIGNED

[ ] If this box is marked, supplier must sign Acceptance and return the following number of copies:

17. ACCOUNTING AND APPROPRIATION DATA/LOCAL USE
96X3123 CC123341000000 (MC)
Award Oblig Amt US$ 34,481.00

18. ITEM NO.	19. SCHEDULE OF SUPPLIES/SERVICE	20. QUANTITY ORDERED/ACCEPTED*	21. UNIT	22. UNIT PRICE	23. AMOUNT
	FURNISH NECESSARY SUPPLIES AND SERVICES TO PERFORM BORINGS TO DEFINE THE CHARACTER OF SUBSURFACE MATERIALS AND TO DETERMINE THE DEPTH, CONTOUR AND QUALITY OF THE BEDROCK IN ACCORDANCE WITH THE ATTACHED SCOPE OF WORK AND DRAWINGS.				

*If quantity accepted by the Government is same as quantity ordered, indicate by x. If different, enter actual quantity accepted below quantity ordered and encircle.

24. UNITED STATES OF AMERICA
Charles W. Coe 8/30/94
BY: CHARLES W. COE C01
CONTRACTING/~~ORDERING~~ OFFICER

25. TOTAL $ 34481.00

29. DIFFERENCES

30. INITIALS

26. QUANTITY IN COLUMN 20 HAS BEEN
[ ] INSPECTED [ ] RECEIVED [ ] ACCEPTED AND CONFORMS TO THE CONTRACT EXCEPT AS NOTED

DATE SIGNATURE OF AUTHORIZED GOVERNMENT REP.

27. SHIP. NO.
[ ] PARTIAL
[ ] FINAL

28. D.O. VOUCHER NO.

32. PAID BY

33. AMT VERIFIED CORRECT FOR

31. PAYMENT
[ ] COMPLETE
[ ] PARTIAL
[ ] FINAL

34. CHECK NUMBER

35. BILL OF LADING NO.

36. I certify this account is correct and proper for payment

DATE SIGNATURE AND TITLE OF CERTIFYING OFFICER

37. REC'D AT	38. RECEIVED BY	39. DATE REC'D	40. TOTAL CONT.	41. S/R ACCOUNT NUMBER	42. S/R VOUCHER NO.

ITEM NO.	SCHEDULE OF SUPPLIES/SERVICE	QUANTITY	U/I	UNIT PRICE	AMOUNT
0126	GEOTECHNICAL INSPECTOR	128.00	HR	48.000000	6144.00
0128	PER DIEM - OVERNIGHT STAY	16.00	DA	55.000000	880.00
0129	MILEAGE FROM WALTHAM, MA AND RETURN	200.00	MI	0.500300	100.00
0130	GEOTECHNICAL SERVICES AND REPORT GEOTECHNICAL REPORT (PRICE EXPRESSED AS 50 PER CENT OF LINE ITEM 0001 OR 0003)	1.00	JB	3072.000000	3072.00
0131	SURVEYING MOBILIZATION AND DEMOBILIZATION	1.00	JB	450.000000	450.00
0133	MILEAGE FROM/TO CONTRACTOR'S EQUIPMENT STORAGE SITE(S). SITE(S) LOCATED IN	300.00	MI	0.500500	150.00
0134	SURVEY CREW AND EQUIPMENT	1.00	DA	880.000000	880.00
0136	DATA REDUCTION AND PLOTTING (PRICE EXPRESSED AS A PERCENTAGE OF LINE ITEM 0011).	1.00	JB	660.000000	660.00
0138	SAMPLE DELIVERY	1.00	JB	110.000000	110.00
0139	MOBILIZATION AND DEMOBILIZATION ONE DRILL RIG, CREW AND AUXILLARY EQUIPMENT MOBILIZATION AND DEMOBILIZATION	1.00	JB	1320.000000	1320.00
0141	MILEAGE FROM/TO CONTRACTOR'S MAIN EQUIPMENT STORAGE SITE. SITE LOCATED IN	300.00	MI	1.650000	495.00
0143	STANDBY TIME/ON SITE MOVES	32.00	HR	110.000000	3520.00

TEM NO.	SCHEDULE OF SUPPLIES/SERVICE	QUANTITY	U/I	UNIT PRICE	AMOUNT
0166	DRIVE SAMPLE BORING WITHOUT CASING: CONTINUOUS SAMPLING 0-30 FT. DEPTH	80.00	LF	16.000000	1280.00
0185	DRIVING AND PULLING CASING BX, NX SIZE	60.00	LF	18.000000	1080.00
0187	6-INCH SIZE	20.00	LF	25.000000	500.00
0205	NWX SIZE AND/OR NWM	80.00	LF	77.000000	6160.00
0240	LUMBER FOR WORK PLATFORM OR SHORING	4.00	MB	1000.000000	4000.00
0244	CRANE AND OPERATOR	32.00	HR	115.000000	3680.00

ATTACHMENT NO. 1

GED REQUISITION NO. 94-17

SCOPE OF WORK

PROJECT: Borings, Sampling and Rock Coring

SITE: Townshend Dam, Townshend, VT

PURPOSE: Perform borings to define the character of subsurface materials in the scour hole at the head of the outlet channel, and to determine the depth, contour and quality of the bedrock in the surrounding embankments. This information is required to design a system of post and timber lagging retaining walls and eliminate undermining of the outlet portal and erosion of the surrounding embankments.

1. SCOPE OF INVESTIGATIONS

a. General. Townshend Dam is located on the West River in Townshend, Vermont (see Plate Nos. 1 & 2). Subsurface explorations will consist of four (4) borings to be located on the surrounding outlet channel banks as shown on the attached Plan of Explorations (Plate No. 3). Some borings will require overburden sampling and all borings will require coring 20 feet into bedrock. Overburden is expected to range from 0 to 20 feet. Boreholes may be started with 6-inch diameter casing to allow progressive telescoping down to Nx-sized rock core. Continuous overburden sampling shall be conducted using a 3-inch I.D. solid spoon. It is assumed that boulders will be encountered at some of the borehole locations; boulders will be cored. Rock cores shall be Nx-sized. Boreholes shall be grouted upon completion of the hole.

b. Inspection. The Contractor shall provide one geologist or geotechnical engineer for field inspection during performance of the borings. The Contractor shall also provide sample jars and core boxes as required. It is possible that the Government will provide its own geologist or geotechnical engineer to perform the drilling inspection. If so, the Contractor will be informed of this decision along with the Notice to Proceed, and the Contractor will not be required to provide a field inspector and will not have to submit a comprehensive report as outlined in the Government contract. All samples shall be delivered by the Contractor to the U.S. Army Corps of Engineers, 424 Trapelo Rd., Bldg. 142, Waltham, MA, 02254-9149.

c. Surveys. Prior to drilling, boring locations will be located and marked by the Government. Upon completion of all holes, the Contractor shall provide a licensed surveyor to determine the coordinates (northings and eastings) and ground elevation at each borehole location. Local control points will be provided by the Government.

2. SITE CONDITIONS.

At Townshend Dam, drilling operations shall be on the surrounding outlet channel banks as shown on the attached plan and photographs. Drilling on steep slopes (up to 1 vertical on 1

horizontal) consisting of loose boulders, cobbles, and rockfill underlain by loose sands and gravels is required. The toes of the slopes are in water varying in depth to 12 feet. Discharge from the outlet channel conduit is expected to be about 100 cfs during drilling and stream velocities are expected to be about 5 to 10 fps. Access to the outlet channel area via an existing gravel road (see Plate 3) is available and will accommodate large construction equipment. However, access to some or all of the actual boring locations may require constructing timber platforms and/or utilizing tie off and anchoring methods (i.e. securing drill rig and platforms by using "deadmen" or heavy equipment and cables). Photographs of the existing site conditions are shown on Plates 4 through 7. These photos are provided to give the Contractor some indication of the existing access conditions but are not intended to fully represent all field conditions. Construction methods and drilling operations must ensure safe working condition and be in compliance with all safety standards referenced in the contract documents.

3. RIGHT-OF-ENTRY. Rights-of-Entry will not be required.

4. COORDINATION. The Government points of contact (POC's) are Steve Dunbar at (617) 647-8174 and Phillip Morrison, P.M. at (802) 365-7703 or 874-4881. The Government POC's shall be notified one week prior to the commencement of the work.

5. COMPLETION SCHEDULE. All work under this delivery order shall be completed within the following time limits:

Mobilization to Site: NLT 10 days after NTP

Complete Field Explorations: NLT 30 days after NTP

Submission of Draft Report: NLT 20 days after completion of explorations

Submission of Final Report: NLT 5 days after receipt of Government review comments

6. QUALITY CONTROL. The Contractor will be held responsible for all damages caused the government as a result of contractor negligence in the performance of any services furnished under the contract. Although submissions required by your contract are technically reviewed by the Government, it is emphasized that your work must be prosecuted using proper internal controls and review procedures. the letter of transmittal for each submission which you make shall include a certification that the submission has been subjected to your own review and coordination procedures to insure (a) completeness for each discipline commensurate with the level of effort, omissions, conflicts, and (c) the overall professional and technical accuracy of the submission. Documents which are deficient in any of these areas will be returned to you for correction and/or upgrading prior to our completing our review. Contract submission dates will not be extended if a resubmission of draft material is required for this reason.

7. Permits All necessary permits will be obtained by the Government.

↓ = approx location of prop. boring.

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS

CONNECTICUT RIVER FLOOD CONTROL

D.S.S DESIGN BY	TOWNSHEND DAM OUTLET CHANNEL **REPRESENTATIVE PHOTOS**
D.S.S DRAWN BY	
T.L.B. CHECK BY	WEST RIVER, VERMONT
GEOTECH. ENG. DIV.	SCALE: AS SHOWN
PLATE NO. 4	DATE:

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS

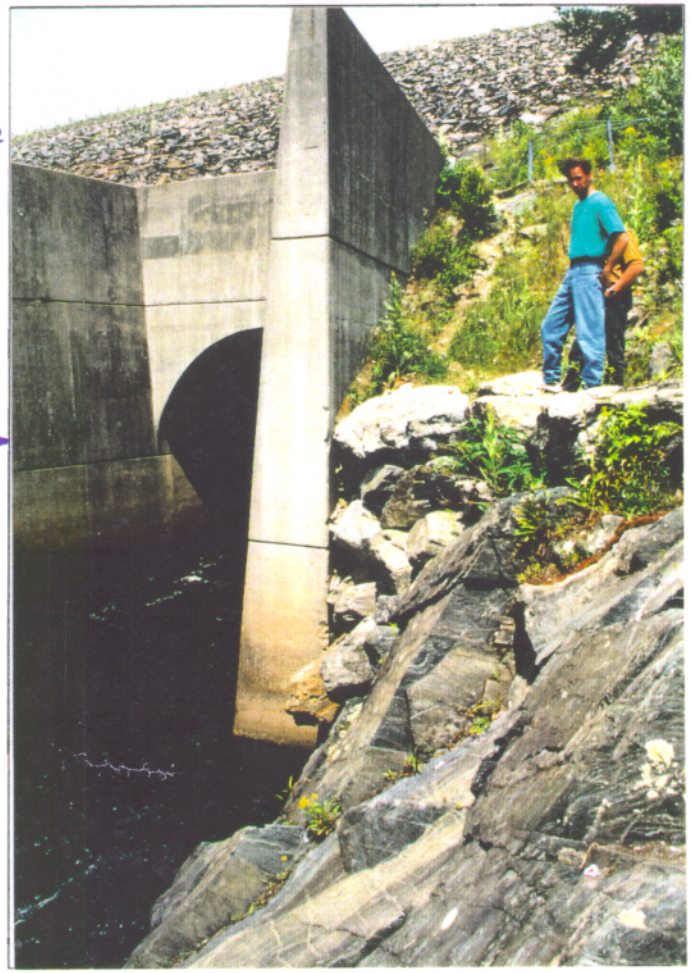
CONNECTICUT RIVER FLOOD CONTROL

TOWNSHEND DAM
OUTLET CHANNEL
REPRESENTATIVE PHOTOS

WEST RIVER, VERMONT

D.S.S DESIGN BY	
D.S.S DRAWN BY	
T.L.B. CHECK BY	
GEOTECH. ENG. DIV.	SCALE: AS SHOWN
PLATE NO. 5	DATE:

General View of Site Looking North



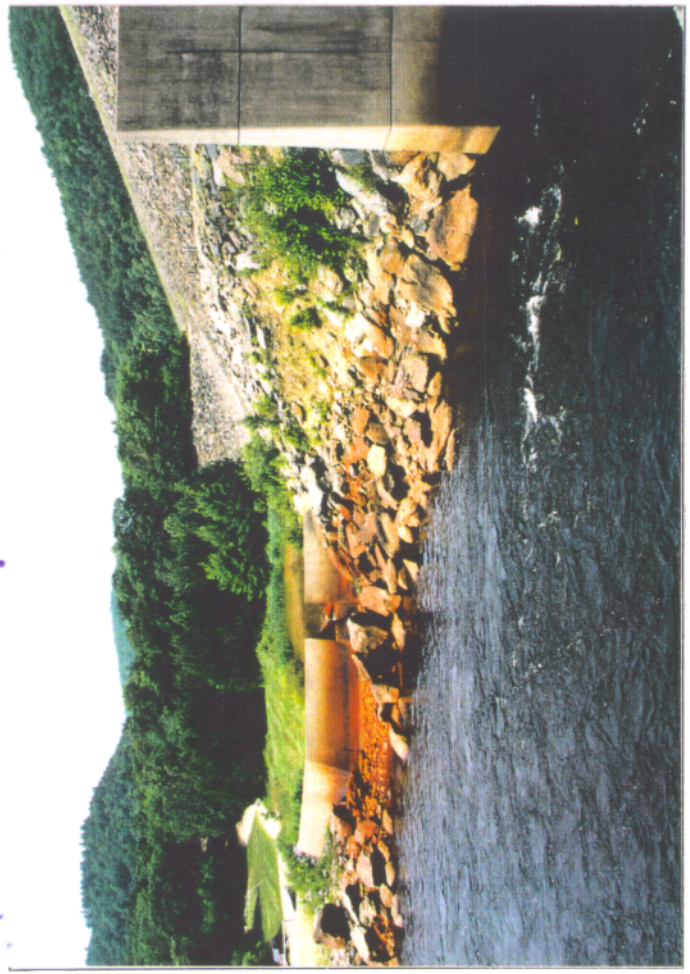
East Side of Outlet Works Looking Northwest

Access/Open Area above East Slope Looking Northwest

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS

S.W.D. DESIGN BY	TOWNSHEND SCOUR HOLE
S.W.D. DRAWN BY	SUPPLEMENTAL PHOTOGRAPHS
M.A.V. CHECK BY	TAKEN JULY 5. 1994
GEOTECH. ENG. DIV.	SCALE: AS SHOWN
PLATE NO. 6	DATE: AUGUST 1994

East Slope Looking Southeast.



West Slope Looking West

West Side of Outlet & West Slope Looking North

↓ = approx. location of proposed boring

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS

S.W.D. DESIGN BY	TOWNSHEND SCOUR HOLE
S.W.D. DRAWN BY	SUPPLEMENTAL PHOTOGRAPHS
M.A.V. CHECK BY	TAKEN JULY 5, 1994
GEOTECH. ENG. DIV.	SCALE: AS SHOWN
PLATE NO. 7	DATE: AUGUST 1994

b. Project Site

The project site is located on Townshend Dam in Townshend, Vermont.

c. Purpose

The purpose of the investigation was to define character of subsurface materials in the scour hole at the head of the outlet channel.

d. Scope of Work

Inspection and exploration instructions were provided by the Army Corps of Engineers (NED), in Delivery Order No. 0010 and are included in Section 3a. of this report. General inspection and exploration instructions were provided by the Army Corps of Engineers (NED) through the contracted Specifications for Services, and Equipment Necessary for Conducting Geotechnical Exploratory Work Various Locations in New England.

Drilling and sampling were performed by Atlantic Testing Laboratories, Limited's (ATL) personnel using ATL equipment. The test borings were sampled using a 2-1/2" I.D. split spoon sampler advanced with a 300-lb. safety hammer and a drop height of 18". The borings were advanced using NW casing by spinning and washing. Cores of the overburden and bedrock were obtained using a 2-1/2" I.D. NXM double tube core barrel.

The proposed scope of work required four test borings advanced from wooden platforms constructed on either side of the outlet channel scour hole on the rip-rap slopes. The borings were performed from September 20 trough September 27, 1994.

ATL's surveyors provided locations and elevations for the test borings.

SECTION 4

QUALITY CONTROL

a. General Certification Statement

I hereby certify that the records, equipment, and procedures mentioned herein were used to perform the subsurface exploration. I also certify that the work was performed in a professional manner and meets the requirements set forth in the Delivery Order. This report has been subject to my review and is both complete and technically accurate.

CERTIFIED, October 6, 1994

Spencer F. Thew, P.E./L.S.

b. General Statement

The equipment and procedures used to perform the subsurface investigation are summarized below.

c. Records Taken

The "General Project Map", "Site Location Plan", and "Boring Location Plan" are included in Section 8.

Pertinent drilling procedures, sampling operations, and soil classification data were noted on the following forms provided by the Corps of Engineers:

NED 198	Daily Log of Field Explorations
NED 58 and 58a	Field Log of Test Boring
NED 121	Field Log of Test Boring
NED 59	Subsurface Water Observations
NED 130	Field Log of Test Boring in Rock

A series of logs for each of the borings is included in Section 8.

A summary of daily activities and a telephone log are Table I and Table II of Section 5, respectively. A chain of custody log is in Section 6. Safety meeting, reports, and NED Form 251 are in Section 7.

d. Equipment Used

Drilling equipment, survey equipment and supplies were provided by Atlantic Testing Laboratories, Limited (ATL). The subcontracted crane, with operator, was owned and operated by Miller Construction of Windsor, Vermont. A list of pertinent equipment follows:

1. Survey Equipment:

   - 1 Topcon Electronic Theomat with single and triple reflectors

2. Drilling Equipment:

   - CME-45C trailer-mounted drill rig
   - NW size casing with spin shoes
   - Drill rod, NW-threaded in 2 ft, 5 ft and 10 ft lengths used for sampling and advancing a roller bit
   - 300-lb. safety hammer for driving split spoon samples
   - 2 ft x 2-1/2" I.D. split spoon samplers
   - 5 H.P. Honda sump pump with connecting hose and water holding tank
   - NXM double tube size core barrels with diamond bits.

3. Subcontract Equipment:

   - Link Belt 30-T Crane/Operator

e. Procedures

1. General Statement

   A test boring investigation was performed on the rip-rap slopes of Townshend Dam outlet channel, Townshend, Vermont during the period September 19, 1994 through September 28, 1994.

2. Surveying Procedures

   Atlantic Testing Laboratories, Limited's surveyors were on-site to determine the boring locations and elevations as drilled.

   a. Horizontal and Vertical Control:

   Stake out: Proposed boring locations were provided by the Corps of Engineers with flagged wooden stakes and/or fluorescent paint.

3. Boring Location Procedures

   The coordinates and elevations for Townshend Dam control monuments were provided by the Corps of Engineers. Actual test boring locations and elevations were determined from angle/distance measurements from these monuments using the electronic theodolite and distomat.

e. Procedures (con't.)

4. Sampling and Drilling Procedures

Four borings were performed at Townshend Dam. The field exploration included drilling, soil sampling, and rock coring.

Soil sampling techniques involved retrieving material using the Standard Penetration Test. A 2-1/2" I.D. x 2 ft long split spoon sampler was advanced using a 300-lb. safety hammer. Samples were classified in the field in accordance with ASTM D-2488. Representative samples were taken from each soil sampling run and placed in 32-oz. jars with hermetically-sealed lids. Sample jars were labeled using a form similar to ENG Form 1742.

Overburden and bedrock was cored using a 5 ft long NXM double tube size core barrel and diamond bit. The rock core retrieved was placed in 5 ft long core boxes as specified in the contract. Bore holes were grouted upon completion of hole.

A Chain-of-Custody Log was maintained to document custody of samples between ATL and the USACE.

SECTION 5

SUMMARY OF ACTIVITIES

AND

CONVERSATION LOGS

a. SUMMARY OF ACTIVITIES

TABLE I

DATE	ACTIVITY
Monday, September 19, 1994	**5:00 pm - 6:00 pm, ATL Drill rig and 2 person drill crew (M. Hawkins, driller and C. Wheeler, helper), superintendent (P. Davis) and second helper (D. Hamilton) on site.** - Mobilized CME-45C drill rig, crew, and equipment to site. Unloaded drill rig trailer and equipment at Corps of Engineer's office at Townshend Dam. - 6:00 pm departed site.
Tuesday, September 20, 1994	**6:00 am - 6:00 pm, ATL Drill rig and 2 person drill crew, superintendent, and second helper on site.** **12:00 pm - 6:00 pm, Geotechnical Inspector (T. Wiggins) on site.** **Crane and operator on site.** - Drill crew prepared rig for move to FD-D; moved drill tools and supplies to FD-D. - 30-Ton Crane and operator picked drill rig from trailer and placed rig on location FD-D. - P. Davis (ATL Superintendent) obtained keys from P. Morrison (CE-NED Site Representative), and permission to use telephone for job-related purposes. - P. Davis and D. Hamilton (ATL Helper) constructed drilling platform at location FD-C. P. Davis purchased 1660 board feet of lumber and began construction of drilling platform at location FD-A. - M. Hawkins (ATL driller) and C. Wheeler (ATL helper) sampled FD-D with 3" O.D. split spoon from 0' - 4'; destroyed sampler attempting sample from 4' - 6' on large boulder. - Drill crew roller bitted through boulder to 5' and advanced NW casing to 5'; cored rip-rap overburden from 5' - 11' using NXM double tube core barrel; encountered bedrock at 11'. No soil present in overburden below 2'. - Drill crew cored bedrock from 11' - 33' using double tube core barrel. - T. Wiggins (ATL Geotechnical Inspector) contacted Y. Yatsevich (CE-NED) to report progress and schedule, and obtained permission to grout bore hole at end of day. - Drill crew grouted bore hole at location FD-D and marked for surveyors. - All personnel departed site at 6:00 pm; locking all gates.

a. **SUMMARY OF ACTIVITIES (con't.)**

TABLE I (con't.)

DATE	ACTIVITY
Wednesday, September 21, 1994	**6:00 am - 6:00 pm, ATL drill rig and 2 person drill crew, superintendent, second helper, and two geotechnical inspectors (T. Wiggins, and A. Brown) on site.** - Drill crew prepared rig for move with crane to location FD-C (standby for crane). - Superintendent and helper completed construction of all three drilling platforms for locations FD-C, FD-A, and FD-B. - 6:00 pm departed site.
Thursday, September 22, 1994	**6:00 am - 7:30 pm, ATL drill rig and 2 person drill crew, second helper, and geotechnical inspector (T. Wiggins) on site.** **Crane and operator on site.** **9:30 am - 2:30 pm, R. Schmidt (CE-NED Geologist) on site.** - Crane moved rill rig from location FD-D to FD-C. - Drill crew cored bedrock with NXM double tube core barrel from 0' (surface in stream bottom) to 19' at location FD-C. - R. Schmidt observed coring technique, rock core, and gave permission to grout the core hole at 19'. - Drill crew grouted the core hole at location FD-C and prepared rig and equipment for move to FD-A. - Crane moved drill rig from location FD-C to FD-A. Crew unbolted platform at location FD-C. - Crane moved wooden platform from location FD-C to surface of dam. D. Hamilton disassembled platform. - R. Schmidt and T. Wiggins located monumentation for survey work. - Drill crew advanced boring at location FD-A by coring with NXM double tube core barrel and by rotary wash methods using NW casing and roller bits through 15' of rock overburden (rip-rap). Bedrock was cored using NXM double tube core barrel to 35'. - 8:00 pm departed site.
Friday, September 23, 1994	**6:00 am -11:00 am, ATL drill rig and 2 person drill crew on site.** - Drill crew grouted bore hole at location FD-A and prepared rig and equipment for move to location FD-B. - 11:00 am departed site.

a. SUMMARY OF ACTIVITIES (con't.)

TABLE I (con't.)

DATE	ACTIVITY
Monday, September 26, 1994	**11:00 pm -7:00 pm, ATL drill rig and 2 person drill crew (M. Hawkins driller; C. Wheeler, Helper), geotechnical inspector (A. Brown), and surveying crew.** **Crane and operator on site.** - Surveyors mobilized to site to locate borings as placed. - Moved drill rig with 30-T crane from FD-A to platform at FD-B. Advanced NXM double tube core barrel to 5'. No soil present in overburden. Roller bitted to 10'. Advanced NW casing to 11' and NXM core barrel to 14.5'. Drop encountered at 14.5' (overburden). - Advanced NW casing to 17.5' and NXM core bar4el from 16.5' to 21.5'. Bedrock encountered at 16.5'. - 7:00 pm departed site.
Tuesday, September 27, 1994	**6:00 am - 6:00 pm, ATL drill rig and 2 person drill crew, and geotechnical inspector.** **Crane and operator on site.** - Advanced NXM core barrel from 21.5' to 36.5' in bedrock. Grouted bore hole upon completion. Removed drill rig, platform and equipment with crane, and prepared for demobilization. - A. Brown (ATL Geotechnical Inspector) contacted S. Dunbar (CE-NED) to report completion of project. Not available, left message. - 6:00 pm departed site.
Wednesday, September 28, 1994	**6:00 am - 9:00 am, ATL drill rig and 2 person drill crew.** - Drill crew demobilized equipment from dam site, and performed project cleanup. - Field work completed. - 9:00 am departed site.

b. LIST OF TELEPHONE LOGS
TABLE II

DATE	CONVERSATION
Tuesday, September 13, 1994	**P. Davis (ATL) to S. Dunbar (CE-NED)** - P. Davis stated startup time would be Monday, September 19, 1994. Start drilling on Wednesday, September 21, 1994, possibly Tuesday afternoon. - S. Dunbar requested P. Davis to call him back on Friday, September 16, 1994 to confirm times and requirements for ATL geotechnical inspector to be on site.
Friday, September 16, 1994	**P. Davis (ATL) to P. Morrison (CE-NED)** - Reported mobilization on Monday, September 19, 1994. P. Morrison will give ATL keys to gates. - P. Davis told P. Morrison that lumber would arrive on Monday morning, September 19, 1994 and P. Morrison will try to be on site to receive lumber, and allow the truck driver to unload the lumber.
Friday, September 16, 1994	**P. Davis (ATL) to S. Dunbar (CE-NED)** - Confirmed schedule of mobilization on Monday, September 19, 1994. Start drilling on Tuesday. This schedule met with S. Dunbar's approval. S. Dunbar stated Y. Yatsevitch and R. Schmidt (CE-NED) would be on site Wednesday, September 21, 1994.
Tuesday, 4:10 pm September 20, 1994	**T. Wiggins (ATL) to T. Petraska (Miller Construction)** - Confirmed schedule for crane and operator for move from location FD-D to platform at FD-C. Crane will be on site Wednesday pm, September 21, 1994.
Tuesday, 3:50 pm September 20, 1994	**T. Wiggins (ATL) to Y. Yatsevitch (CE-NED)** - Reported bedrock was encountered at 11' at FD-D and coring will be completed by end of day. - Described overburden as rip-rap (boulders with little or no soil present). - Obtained permission to grout bore hole upon completion of coring. - Y. Yatsevitch asked that ATL mark hole locations carefully for ATL surveyors.
Tuesday, 3:56 pm September 20, 1994	**T. Wiggins (ATL) to M. Remington (ATL)** - Reported progress and schedule.

b. LIST OF TELEPHONE LOGS (con't.)
TABLE II

DATE	CONVERSATION
Wednesday, 7:15 am September 21, 1994	**T. Wiggins (ATL) to Y. Yatsevitch (CE-NED)** - Reported schedule for crane and operator in order to avoid a trip for CE-NED representatives, when ATL would not be coring. Y. Yatsevitch rescheduled site visit to Thursday, September 22, 1994. - Reported that rig on standby waiting for crane (expected pm today).
Thursday, 2:45 pm September 22, 1994	**T. Wiggins (ATL) to M. Remington (ATL)** - Reported drilling progress and schedule.
Tuesday, 12:00 pm September 27, 1994	**A. Brown (ATL) to S. Thew and T. Wiggins (ATL)** - Reported completion of FD-B (last of four borings), and beginning of demobilization from site. **A. Brown (ATL) to S. Dunbar (CE-NED)** - Reported completion of final boring. S. Dunbar was not in office, left message.
Friday, 3:05 pm September 30, 1994	**A. Brown (ATL) to S. Dunbar (CE-NED)** - Reported progress on draft report. Told him draft report and core samples should be to him by end of next week.

SECTION 6

CHAIN OF CUSTODY LOG

02222

CHAIN OF CUSTODY RECORD

atl ATLANTIC TESTING LABORATORIES, Limited

SCIENCE AND ENGINEERING
P.O. BOX 29
CANTON, NEW YORK 13617
315-386-4578, FAX 315-386-1012

ENVIRONMENTAL LABORATORY
48 LAGRASSE STREET
WADDINGTON, NEW YORK 13694
315-388-4452, FAX 315-388-5510

PROJECT NUMBER	PROJECT CONTACT	QA/QC CODE
CD0047	Steve Dunbar ACOE	☐ DEC/ASP ☐ NYSDOH ☐ CLP ☐ SW-846 ☐ OTHER
PAGE___OF___		

PROJECT NAME	PROJECT LOCATION
Townshend Dam	Townsheng VT.

REPORT DISTRIBUTION

DATES REQUIRED:

SEND REPORT TO:

FAX RESULTS TO: _____ AT _____

CUSTODY SEAL 'X' EQUALS INTACT

DATE	TIME	SAMPLE LOCATION	SAMPLE TYPE*	NO. OF CONT.	PARAMETERS	LABORATORY IDENTIFICATION NUMBER	FIELD NOTES
9/20/94		Five Boxes, Rocklores	Cores	5			
to		(FD-A thru FD-D)					
9/27/94							
		Two Soil Sample Jars	Quart Jar.	2			
		(FD-D)					

SAMPLERS NAME: A. Brown, T. Wiggins DATE:
SAMPLERS SIG: TIME:

RECEIVED FOR LABORATORY NAME: DATE: TIME:
SIG:

SHIPMENT REC'D INTACT(YES/NO)?

SAMPLES RELINQUISHED BY:	SAMPLES RECEIVED BY:
NAME: DATE: TIME: SIG:	NAME: Fred S. Fairneny DATE: 10/4/94 TIME: SIG:
NAME: Fred S. Fairneny DATE: 10/4/94 TIME: 1350 SIG:	NAME: DATE: 10/4/94 TIME: 1350 SIG: Susan Reys
NAME: DATE: TIME: SIG:	NAME: DATE: TIME: SIG:

* SAMPLE TYPE CODE KEY
B = QA/QC
C = COMPOSITE
G = GRAB
H = HEXANE SURFACE WIPES
ND = NOT DETERMINED BY SAMPLER
O = OIL
S = SOLID OR SLUDGE
W = WATER

DISTRIBUTION: WHITE WITH SAMPLES GREEN TO SCIENCE AND ENGINEERING FILES, GOLD TO CLIENT

LABORATORY STORAGE LOCATION:

LABORATORY REMARKS

THINK QUALITY

SECTION 7

SAFETY REPORTS

WEEKLY SAFETY MEETING

NEDSO Date held 9/20/94

THRU: Area Engineer, _____ Area Time 6:30 AM

TO: Safety Office, NED

1. Weekly safety meeting was held this date for the following personnel:

Contract No._____ Contractor ATL

Conducted By T. Williams Personnel present (Contr)_____

(Sub)_____

Subjects discussed (Note, delete, or add): (Govt)_____

Individual Protective Equipment - HARD HATS, BOOTS

Prevention of Falls - SAFE HARNESS, STEEP SLOPES, USE ROPES PREVIOUS

Safe Lifting Techniques - YES

Emergency Communications - YES

Fire Prevention - N/A

Sanitation, First Aid - YES

Tripping Hazards - trash, hose, nails in lumber - YES

Staging, Ladders, Concrete Forms - N/A

Hand Tools, Portable Power Tools, Woodworking Machinery - YES

Equipment Maintenance (Zero defects) - YES

Hoisting Equipment - YES

Ropes, Hooks, Chains and Slings - YES

Electrical Grounding, Temporary Wiring - YES

Lockouts for safe clearance procedures - electrical, pressure, moving part YES

Welding - N/A

Excavations - N/A

Loose Rock and Steep Slopes - YES

Explosives - N/A

Water Safety - YES

Other - NONE

Prepared by A. Wiggins Title QC Insp.

2. Forwarded.

Signature_____

Resident Engineer

CP: MANHOURS

Contractor 2345

SubContractor 16.0

Period Covered 9/19/94 - 9/23/94

FIG No. 11

WEEKLY SAFETY MEETING

NEDSO

Date held 9/26/94 (mon)

THRU: Area Engineer, _____ Area

Time 12:30pm

TO: Safety Office, NED

1. Weekly safety meeting was held this date for the following personnel:

Contract No. _____ Contractor Atlantic Testing

Conducted By A. Brown Personnel present (Contr) _____

(Sub) _____

Subjects discussed (Note, delete, or add): (Govt) _____

Individual Protective Equipment - Hardhats, boots, Glasses

Prevention of Falls - Use Rope to Access Drill Platform

Safe Lifting Techniques - Yes

Emergency Communications - Yes

Fire Prevention - Yes

Sanitation, First Aid - Yes

Tripping Hazards - trash, hose, nails in lumber - Yes

Staging, Ladders, Concrete Forms - Yes

Hand Tools, Portable Power Tools, Woodworking Machinery - Yes

Equipment Maintenance (Zero defects) - Yes

Hoisting Equipment - Yes

Ropes, Hooks, Chains and Slings - Yes

Electrical Grounding, Temporary Wiring - Yes

Lockouts for safe clearance procedures - electrical, pressure, moving part

Welding - NA

Excavations - NA

Loose Rock and Steep Slopes - Rope on Slope!

Explosives - NA

Water Safety - Yes

Other -

Prepared by _____ Title Geotechnical Eng.

2. Forwarded.

Signature _____

Resident Engineer

CP: MANHOURS

Contractor 20.0

SubContractor 16.0

Period Covered 9/24/94 - 9/25/94

FIG No. 11

SECTION 8

FIELD INSPECTOR'S LOGS AND MAPS

a. Daily Log of Field Explorations

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U.S. ARMY
WALTHAM, MASSACHUSETTS

FOUNDATIONS & MATERIALS BRANCH

LOG NO. 1 DATE Monday, 9/19/94

DAILY LOG OF FIELD EXPLORATIONS

PROJECT TOWNSHEND DAM
TEMPORARY ADDRESS Box 301 Wilder, VT 05088
LOCATION WHERE CAN BE REACHED Same
PHONE (802) 296 7213 TIME PM TEMPERATURE: MAX. 75°F MIN. 50°F
WEATHER P. Cloudy

DRILLING TODAY

HOLE	AREA	FOOTAGE FROM	FOOTAGE TO	FOOTAGE TODAY	MATERIAL

TEST PITS OR AUGER BORINGS TODAY

HOLE	AREA	DEPTH	MATERIAL

HOLE	AREA	DEPTH	MATERIAL

PERSONNEL

NAME	HOURS
Paul Davis (Superintendent)	12
Mark Hawkins (Driller)	12
Chris Wheeler (Drill Helper)	12
Don Hamilton (Drill Helper)	12

PLANT USED

ITEM	HOURS	BREAKDOWN HOURS
CME 45C Drill Rig	12	

T. Wiggins
CHIEF OF FIELD PARTY

NED FORM DEC 63 198 REPLACES EDITION OF MAY 62 WHICH MAY BE USED UNTIL EXHAUSTED

(OVER)

9/19/94

NARRATIVE OF DAYS OPERATIONS

Mobilized Drill Rig/Crew from Canton, NY to project site unloaded Equipment at Dam Station House and secured it for the night.

Mobilized lumber from ATL Warehouse.

MAN-HOUR WORK BREAKDOWN

NAME	MOB.	DEMOB.	MOVING	DRILL OVB.	DRILL BEDROCK	PREV. MAINT.	EQUIP. FAILURE	LOST TIME (WEATHER)	INSP. & SUPER.	MISC.	TOTAL
P. Davis	12										12
M. Hawkins	12										12
C. Wheeler	12										12
D. Hamilton	12										12

WORK FOR TOMORROW

Set Drill Rig on location FD-D with crane and operator. Advance test boring to design Depth. Construct Platform at Location FD-L

FIELD PURCHASES

ITEM	AMOUNT
None	

ITEM	AMOUNT

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U.S. ARMY
WALTHAM, MASSACHUSETTS

FOUNDATIONS & MATERIALS BRANCH

LOG NO. 2 DATE Sept 20, 1994 (Tues)

DAILY LOG OF FIELD EXPLORATIONS

PROJECT Townshend Dam

TEMPORARY ADDRESS

LOCATION WHERE CAN BE REACHED

PHONE TIME TEMPERATURE: MAX. 70 MIN. 50

WEATHER P. Sunny

DRILLING TODAY

HOLE	AREA	FOOTAGE FROM	FOOTAGE TO	FOOTAGE TODAY	MATERIAL
FD-D	West Wall	0	33	33	0'to11'-Overburden, 11'to33'-Bedrock

TEST PITS OR AUGER BORINGS TODAY

HOLE	AREA	DEPTH	MATERIAL

HOLE	AREA	DEPTH	MATERIAL

PERSONNEL

NAME	HOURS
Paul Davis (superintendent)	12
Mark Hawkins (Driller)	12
Chris Wheeler (Drill Helper)	12
Don Hamilton (Drill Helper)	12
Tom Wiggins (Geotech. Insp.)	6

PLANT USED

ITEM	HOURS	BREAKDOWN HOURS
CME 45C Drill Rig	12	
50 Ton Crane w/oper.	8	

T. Wiggins
CHIEF OF FIELD PARTY

NED FORM DEC 63 198 REPLACES EDITION OF MAY 62 WHICH MAY BE USED UNTIL EXHAUSTED

(OVER)

9/20/94
(Tue)

NARRATIVE OF DAYS OPERATIONS

Drill crew prepared rig for move to FD-D. 50 Ton Crane picked rig from trailer and placed on location FD-D. Drove split spoon from 0' to 4' where spoon was destroyed. Roller Bitted from 0-5' and spun in NW casing to 5'. Cored from 5' to 13.5' through overburden using NXM Double Tube Core Barrel. Cored Bed rock from 11' to 33' using same. Spun NW Casing to 13.5'.

Construction of Platform at FD-C began

MAN-HOUR WORK BREAKDOWN

NAME	MOB.	DEMOB.	MOVING	DRILL OVB.	DRILL BEDROCK	PREV. MAINT.	EQUIP. FAILURE	LOST TIME (WEATHER)	INSP. & SUPER.	MISC.	TOTAL
T. Wiggins	6		6						6		6
M. Hawkins			3	4	5						12
C. Wheeler			3	4	5						12
P. Davis										12	12
D. Hamilton										12	12

* Constructing Drill Platform at FD-C

WORK FOR TOMORROW

Move Rig to Location FD-C with crane + operator
Complete Construction of Drilling Platforms

FIELD PURCHASES

ITEM	AMOUNT
1660 BF. of Lumber	

ITEM	AMOUNT

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U.S. ARMY
WALTHAM, MASSACHUSETTS

FOUNDATIONS & MATERIALS BRANCH

LOG NO. 3 DATE Wed 9-21-94

DAILY LOG OF FIELD EXPLORATIONS

PROJECT TOWSEND PAM

TEMPORARY ADDRESS

LOCATION WHERE CAN BE REACHED

PHONE TIME TEMPERATURE: MAX. 75 MIN. 50

WEATHER Sunny

DRILLING TODAY

HOLE	AREA	FOOTAGE FROM	FOOTAGE TO	FOOTAGE TODAY	MATERIAL

TEST PITS OR AUGER BORINGS TODAY

HOLE	AREA	DEPTH	MATERIAL

HOLE	AREA	DEPTH	MATERIAL

PERSONNEL

NAME	HOURS
Paul Davis (Superintendent)	11.5
Mark Hawkins (Driller)	11.5
Chris Wheeler (Drill Helper)	11.5
Don Hamilton (Drill Helper)	11.5
Tom Wiggins (Geotech. Insp.)	11.5
Alan Brown (Geotech Insp)	11.0

PLANT USED

ITEM	HOURS	BREAKDOWN HOURS
CME 45C	11.5	

T. Wiggins
CHIEF OF FIELD PARTY

NED FORM DEC 63 198 REPLACES EDITION OF MAY 62 WHICH MAY BE USED UNTIL EXHAUSTED

(OVER)

9/21/94
(Weds)

NARRATIVE OF DAYS OPERATIONS

Drilling crew on stand by waiting for crane to move from Drill rig #6 from FD-D to platform at FD-C. PREPARING Equipment for Move.

Construction of platforms continues for FD-B and FD-A

MAN-HOUR WORK BREAKDOWN

NAME	MOB.	DEMOB.	MOVING	DRILL OVB.	DRILL BEDROCK	PREV. MAINT.	EQUIP. FAILURE	LOST TIME (WEATHER)	INSP. & SUPER.	MISC. *	TOTAL	
P. Davis										11.5	11.5	
M. Hawkins			11.5								11.5	
C. Wheeler			11.5								11.5	
D. Hamilton										11.5	11.5	
T. Wiggins			[illegible]							11.5	11.5	**
A. Brown			11.0								11.0	

* CONSTRUCT PLATFORMS ** - STAND BY / MOVING

WORK FOR TOMORROW

Move Drill Rig from FD-D to FD-C and advance boring to specified depth.

FIELD PURCHASES

ITEM	AMOUNT

ITEM	AMOUNT

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U.S. ARMY
WALTHAM, MASSACHUSETTS

FOUNDATIONS & MATERIALS BRANCH

LOG NO. 4 DATE THURSDAY 9/22/94

DAILY LOG OF FIELD EXPLORATIONS

PROJECT TOWNSHEND DAM

TEMPORARY ADDRESS

LOCATION WHERE CAN BE REACHED

PHONE TIME TEMPERATURE: MAX. 70 MIN. 55

WEATHER CLOUDY

DRILLING TODAY

HOLE	AREA	FOOTAGE FROM	FOOTAGE TO	FOOTAGE TODAY	MATERIAL
FD-C	WEST WALL	0.0	19.0	19.0	BEDROCK
FD-A	ENE WALL	0.0	35.0	35.0	RIP-RAP OVERBURDEN TO 15.0'; BEDROCK

TEST PITS OR AUGER BORINGS TODAY

HOLE	AREA	DEPTH	MATERIAL

HOLE	AREA	DEPTH	MATERIAL

PERSONNEL

NAME	HOURS
M. HAWKINS (DRILLER)	13.5
C. WHEELER (HELPER)	13.5
D. HAMILTON (HELPER)	13.5
T. WIGGINS (GEO. INSP.)	13.5

PLANT USED

ITEM	HOURS	BREAKDOWN HOURS
CME 45C DRILL RIG	13.5	
LINK BELT CRANE W/OPER	8	

CHIEF OF FIELD PARTY

NED FORM DEC 63 198 REPLACES EDITION OF MAY 62 WHICH MAY BE USED UNTIL EXHAUSTED

(OVER)

9/22/94
(Thurs)

NARRATIVE OF DAYS OPERATIONS

Crane moved drill rig from FD-D to FD-C. Advanced borehole at FD-C to 19.0'± All Bedrock (No overburden) with NXM Core
Grouted FD-C to Surface
Crane moved drill rig from FD-C to FD-A. Advanced borehole at FD-A to 35.0' - Rip-rap from 0' to 15' with NXM Core
Bedrock from 15' to 35' with NXM core.
Spun in NW Casing to 15.5'
Construction of Platform At FD-B was completed.
Removal of Platform at FD-C began

MAN-HOUR WORK BREAKDOWN

NAME	MOB.	DEMOB.	MOVING	DRILL OVB.	DRILL BEDROCK	PREV. MAINT.	EQUIP. FAILURE	LOST TIME (WEATHER)	INSP. & SUPER.	MISC.	TOTAL
M. HAWKINS			2	2	9.5						13.5
C. WHEELER			2	2	9.5						13.5
D. HAMILTON									*13.5		
T. WIGGINS			VDM						13.5		13.5

*CONSTRUCTING/DISMANTLING PLATFORMS.

WORK FOR TOMORROW

Dismantle platform FD-C - Prepare drill rig for move to FD-B

FIELD PURCHASES

ITEM	AMOUNT

ITEM	AMOUNT

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U.S. ARMY
WALTHAM, MASSACHUSETTS

FOUNDATIONS & MATERIALS BRANCH

LOG NO. 5 DATE FRIDAY, 9/23/94

DAILY LOG OF FIELD EXPLORATIONS

PROJECT TOWNSHEND DAM

TEMPORARY ADDRESS

LOCATION WHERE CAN BE REACHED

PHONE TIME TEMPERATURE: MAX. 60 MIN. 60

WEATHER RAIN

DRILLING TODAY

HOLE	AREA	FOOTAGE FROM	FOOTAGE TO	FOOTAGE TODAY	MATERIAL

TEST PITS OR AUGER BORINGS TODAY

HOLE	AREA	DEPTH	MATERIAL

HOLE	AREA	DEPTH	MATERIAL

PERSONNEL

NAME	HOURS
M. HAWKINS (DRILLER)	5½
CINKEFLER (HELPER)	5½

PLANT USED

ITEM	HOURS	BREAKDOWN HOURS
CME 45C DRILL RIG	5½	

CHIEF OF FIELD PARTY

NED FORM DEC 83 198 REPLACES EDITION OF MAY 62 WHICH MAY BE USED UNTIL EXHAUSTED

(OVER)

9/23/94
(Fri)

NARRATIVE OF DAYS OPERATIONS

Prepared Drill rig to move to FD-B, Grouted Hole at FD-A

MAN-HOUR WORK BREAKDOWN

NAME	MOB.	DEMOB.	MOVING	DRILL OVB.	DRILL BEDROCK	PREV. MAINT.	EQUIP. FAILURE	LOST TIME (WEATHER)	INSP. & SUPER.	MISC.	TOTAL
M. Hawkins			5								5
C. Wheeler			5								5

WORK FOR TOMORROW

Monday - Move Drill rig to FD-B, Advance Hole to specified depth

FIELD PURCHASES

ITEM	AMOUNT

ITEM	AMOUNT

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U.S. ARMY
WALTHAM, MASSACHUSETTS

FOUNDATIONS & MATERIALS BRANCH

LOG NO. 6 DATE Monday 9/26/94

DAILY LOG OF FIELD EXPLORATIONS

PROJECT Townshend Dam

TEMPORARY ADDRESS

LOCATION WHERE CAN BE REACHED

PHONE TIME TEMPERATURE: 68 MAX. MIN. 55

WEATHER Cloudy

DRILLING TODAY

HOLE	AREA	FOOTAGE FROM	FOOTAGE TO	FOOTAGE TODAY	MATERIAL
FD-B	East Wall	0	21.5	21.5	Overburden and Bedrock

TEST PITS OR AUGER BORINGS TODAY

HOLE	AREA	DEPTH	MATERIAL

HOLE	AREA	DEPTH	MATERIAL

PERSONNEL

NAME	HOURS
A. Brown (Geot. Insp.)	8
M. Hawkins (Driller)	8
C. Wheeler (Drill Helper)	8
Survey Crew	

PLANT USED

ITEM	HOURS	BREAKDOWN HOURS
CME 45C Drill Rig	8	
Link Belt Crane/ Operator	8	

A. Brown
CHIEF OF FIELD PARTY

NED FORM DEC 63 198 REPLACES EDITION OF MAY 62 WHICH MAY BE USED UNTIL EXHAUSTED

(OVER)

9/26/94
(Mon)

NARRATIVE OF DAYS OPERATIONS

Drill Crew, crane/operator, survey crew and geotechnical inspector on site. Surveyed locations and elevations of all four borings. Crane moved drill rig from FD-A to FD-B and removed drilling platform at FD-A.

Advanced boring FD-B from 0' to 21.5'

MAN-HOUR WORK BREAKDOWN

NAME	MOB.	DEMOB.	MOVING	DRILL OVB.	DRILL BEDROCK	PREV. MAINT.	EQUIP. FAILURE	LOST TIME (WEATHER)	INSP. & SUPER.	MISC.	TOTAL
A. Brown									8		8
M. Hawkins			2	3	3						8
C. Wheeler			2	3	3						8
Survey Crew											

WORK FOR TOMORROW

Continue boring FD-B and advance to specified depth. Remove drill rig from platform at FD-B and prepare for demobilization.

FIELD PURCHASES

ITEM	AMOUNT

ITEM	AMOUNT

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U.S. ARMY
WALTHAM, MASSACHUSETTS

FOUNDATIONS & MATERIALS BRANCH

LOG NO. 7 DATE Tuesday 9/27/94

DAILY LOG OF FIELD EXPLORATIONS

PROJECT TOWNSHEND DAM

TEMPORARY ADDRESS

LOCATION WHERE CAN BE REACHED

PHONE TIME TEMPERATURE: MAX. 65 MIN. 55

WEATHER RAIN

DRILLING TODAY

HOLE	AREA	FOOTAGE FROM	FOOTAGE TO	FOOTAGE TODAY	MATERIAL
FD-B	East Wall	21.5	36.5	15	BEDROCK

TEST PITS OR AUGER BORINGS TODAY

HOLE	AREA	DEPTH	MATERIAL

HOLE	AREA	DEPTH	MATERIAL

PERSONNEL

NAME	HOURS
A. BROWN (GEOTECH. INSP.)	10
M. HAWKINS (DRILLER)	12
C. WHEELER (DRILL HELPER)	12

PLANT USED

ITEM	HOURS	BREAKDOWN HOURS
CME 45C DRILL RIG	12	
LINK BELT CRANE /OPERATOR	8	

T. Wiggins for A. Brown
CHIEF OF FIELD PARTY

NED FORM DEC 63 198 REPLACES EDITION OF MAY 62 WHICH MAY BE USED UNTIL EXHAUSTED

(OVER)

9/27/94
(Tuesday)

NARRATIVE OF DAYS OPERATIONS

Advanced boring at FD-B from 21.5' to 36.5' in Bedrock with NXM core. Grouted borehole upon completion. Removed drill rig from platform and loaded on trailor. Removed platform and tools and prepared for demobilization.

MAN-HOUR WORK BREAKDOWN

NAME	MOB.	DEMOB.	MOVING	DRILL OVB.	DRILL BEDROCK	PREV. MAINT.	EQUIP. FAILURE	LOST TIME (WEATHER)	INSP. & SUPER.	MISC.	TOTAL
A. Brown			4						6		10
M. Hawkins			4		8						12
C. Wheeler			4		8						12

WORK FOR TOMORROW

Complete demobilization.

FIELD PURCHASES

ITEM	AMOUNT

ITEM	AMOUNT

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U.S. ARMY
WALTHAM, MASSACHUSETTS

FOUNDATIONS & MATERIALS BRANCH

LOG NO. 8 DATE Wednesday 9/28/94

DAILY LOG OF FIELD EXPLORATIONS

PROJECT TOWNSHEND DAM

TEMPORARY ADDRESS

LOCATION WHERE CAN BE REACHED

PHONE TIME TEMPERATURE: MAX. 65 MIN. 55

WEATHER LIGHT RAIN

DRILLING TODAY

HOLE	AREA	FOOTAGE FROM	FOOTAGE TO	FOOTAGE TODAY	MATERIAL

TEST PITS OR AUGER BORINGS TODAY

HOLE	AREA	DEPTH	MATERIAL

HOLE	AREA	DEPTH	MATERIAL

PERSONNEL

NAME	HOURS
M. HAWKINS (DRILLER)	11
C. WHEELER (HELPER)	11

PLANT USED

ITEM	HOURS	BREAKDOWN HOURS
CME 45C DRILL RIG	11	

CHIEF OF FIELD PARTY

NED FORM DEC 63 198 REPLACES EDITION OF MAY 62 WHICH MAY BE USED UNTIL EXHAUSTED

(OVER)

9/28/94
(Wednesday)

NARRATIVE OF DAYS OPERATIONS

Drill crew completed project cleanup, prepared drill rig and tools for demobilization; Returned keys to CORPS. Personnel and reported that we are demobilizing to Canton, N.Y.

MAN-HOUR WORK BREAKDOWN

NAME	MOB.	DEMOB.	MOVING	DRILL OVB.	DRILL BEDROCK	PREV. MAINT.	EQUIP. FAILURE	LOST TIME (WEATHER)	INSP. & SUPER.	MISC.	TOTAL
M. Hawkins		8	3								11
C. Wheeler		8	3								11

WORK FOR TOMORROW

FIELD PURCHASES

ITEM	AMOUNT

ITEM	AMOUNT

b. Boring Logs

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site TOWNSHEND DAM Page 1 of 3 Pages

Boring No. ~~FD-A~~ FD-94-X3 Desig. FD-A Diam. (Casing) 3"

Co-ordinates: N 201255.60 E 446170.20

Elevation Top of Boring 460.23 M.S.L. Hammer Wt. _____ Boring Started 9/21/94

Total Overburden Drilled 15' Feet Hammer Drop _____ Boring Completed 9/22/94

Elevation Top of Rock 445.23 M.S.L. Casing Left _____

Total Rock Drilled 20 19.5 Feet Subsurface Water Data 451.43 Page SEE SEC. 9

Elevation Bottom of Boring 425.73 M.S.L. Obs. Well _____

Total Depth of Boring 35' Feet Drilled By Ma. Hawkins, C. Wheeler

Core Recovered 100 % No. Boxes 2 Mfg. Des. Drill CME-45C

Core Recovered 19.5 Ft : ____ Diam. ____ In. Inspected By: T. Wiggins

Soil Samples NONE In. Diam. ____ No. Classification By: T. Wiggins

Soil Samples _____ In. Diam. ____ No. Classification By: _____

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT CORE RECVY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
1'-5'	OB-1	NXB	0 – 5		ADVANCED NXM DOUBLE TUBE CORE BARREL THROUGH COBBLES AND BOULDERS	COBBLES, BOULDERS 42" RECOVERY (OVERBURDEN)
5'-8'			5 – 8.5		ADVANCED NXM DOUBLE TUBE CORE BARREL THROUGH COBBLES AND BOULDERS	COBBLES, BOULDERS 18" RECOVERY (OVERBURDEN)
9'					AFTER 2ND OVERBURDEN RUN W/ NXM CORE BARREL, SPUN NW CASING TO 15.0'	

GENERAL REMARKS:

ED MAR 58 (Test)

Boring No. FD-A

C-50

FIG NO 2B

DEPTH (ft.)	CORE/SAMPLE NO.	CORE/SAMPLE SIZE	CORE/SAMPLE DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
11–15					Spun NW casing to 15.0' ~~(Rotary Wash Boring)~~ 15.0' Top of Bedrock	Boulders, (Rip-Rap) cobbles, rock fragments (Loose overburden to 15.0')
					Rotary Wash Boring	
16–20	R-1	NXM	15.5 – 20.0	54" Rec.	15.0' Top of Bedrock Spun NW casing to 15.5', then cleaned w/ roller bit to 15.5' Advanced NXM Double Tube core barrel to 20.0' Sampled 15.5' to 20.0'	Bedrock Grey Gneiss 4 total pieces 100% Recovery (54") RQD = 100%
21–25	R-2	NXM	20.0 – 25.0		Advanced NXM Double Tube core barrel to 25.0' Sampled 20.0' to 25.0'	Bedrock Grey Gneiss 3 pieces 100% Recovery RQD = 100%
25–26	R-3	NXM			Advanced NXM Double Tube core barrel to 30.0' Sampled 25.0 to 30.0'	Bedrock Grey Gneiss 4 pieces 100% Recovery RQD = 100%

NED Form 58A (Test)

Boring No. FD-A

C-51

FIG NO

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
28	Run3 (cont)					
29						
			30			
30		NXM			ADVANCED NXM DOUBLE TUBE CORE BARREL TO 35.0'	BEDROCK
31					SAMPLED 30.0' to 35.0'	Grey Gneiss
32	Run4					4 Pieces
33						100% Recovery
34						RQD=100%
			35.0		EXPLORATION TERMINATED	9/22/94
35					BOTTOM of BORING 35.0'	
					HOLE GROUTED W/CEMENT-BENTONITE TO TOP OF HOLE	

NED FORM 58A (Test)

Boring No. FD-A

FIG NO 2

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site TOWSHEND DAM Page 1 of 3 Pages

Boring No. ~~FD-B~~ FD94-X4 Desig. FD-B Diam. (Casing) 3" NW

Co-ordinates: N 201220.59 E 446186.35

Elevation Top of Boring 462.60 M.S.L. | Hammer Wt. _____ | Boring Started 9/26/94

Total Overburden Drilled 16.5 Feet | Hammer Drop _____ | Boring Completed 9/27/94

Elevation Top of Rock 446.10 M.S.L. | Casing Left NO

Total Rock Drilled 20.0 Feet | Subsurface Water Data 455.80 Page SEE SEC. 9

Elevation Bottom of Boring 426.10 M.S.L. | Obs. Well _____

Total Depth of Boring 36.5' Feet | Drilled By M. HAWKINS, C. WHEELER

Core Recovered 95 % No. Boxes 2 | Mfg. Des. Drill CME-45C

Core Recovered 19 Ft : ____ Diam. ____ In. | Inspected By: A. BROWN

Soil Samples NONE In. Diam. ____ No. | Classification By: A. BROWN

Soil Samples _____ In. Diam. ____ No. | Classification By: _____

DEPTH In Ft.	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT CORE RECVY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
1 2 3 4 5	OB-1	NX	0 5	17" Rec. 28%	ADVANCED NXM CORE BARREL THROUGH COBBLES AND BOULDERS	COBBLES AND BOULDERS 17" RECOVERY (OVERBURDEN)
6 7 8 9					ROLLER BITTED TO 10', SPUN NW CASING TO 11' ~~(CASING WOULD NOT ADVANCE)~~	COBBLES AND BOULDERS - VOIDS TO 12" (- OVERBURDEN)

GENERAL REMARKS:

ED ... 58 (Test)

Boring No. FD-B

FIG NO 2B

DEPTH	CORE/SAMPLE NO.	CORE/SAMPLE SIZE	CORE/SAMPLE DEPTH RANGE	BLOWS PER FT / CORE RECVY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
			11			
11	OB-2	NXM	11	20% Rec.	ADVANCED NXM DOUBLE TUBE CORE BARREL to 16' THROUGH COBBLES AND BOULDERS SPUN NXW CASING TO 16.5'	COBBLES AND BOULDERS 12" RECOVERY (OVERBURDEN) (VOIDS to ± 6" THICKNESS)
12						
13						
14						
15						
16			16			
			16 16.5		VOIDS (SPUN CASING)	
17	R-1	NXM	16.5	90% Rec.	ADVANCED NXM DOUBLE TUBE CORE BARREL to 21.5' (5.0') SAMPLED 16.5' to 21.5' SPUN NW CASING to 17.5'	BEDROCK - 90% Recovery, GREY GNEISS 4 PIECES RQD= 100% WEATHERED to 17.5'
18						
19						
20						
21			26.5			
9/27/94 22	R-2	NXM		100% Rec.	ADVANCED NXM DOUBLE TUBE CORE BARREL 5.0' SAMPLED FROM 21.5' to 26.5'	100% RECOVERY RQD= 93%, 6 PIECES GREY GNEISS
23						
24						
25						
26						

NED Form 58A (Test)

Boring No. FD-B

FIG NO 2

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE RECVY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
			26.5			
27		NXM			ADVANCED NXM Double Tube Core Barrel 5.0'	BEDROCK
28	R-3				Sampled From 26.5' to 31.5'	GREY GNEISS
29						100% Recovery
30						RQD = 100%
31			31.5			2 PIECES
32	R-4	NXM			ADVANCED NXM Double Tube Core Barrel 50'	BEDROCK
33					Sampled From 31.5' to 36.5'	GREY GNEISS
34						100% Recovery
35						RQD = 90% (5 Pieces)
36			36.5		End of Exploration 9/27/94	(Quartzite Seams)
37					Bottom of Boring 36.5' Grouted Boring w/ Cement/Bentonite Grout to top of Bedrock	

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site TOWNSHIEND DAM Page 1 of 2 Pages
FD-94-82
Boring No. ____ Desig. FD-C Diam. (Casing) 3" NW
Co-ordinates: N 201265.44 E 4460500

Elevation Top of Boring 453.60 M.S.L. Hammer Wt. ____ Boring Started 9/22/94
Total Overburden Drilled 0 Feet Hammer Drop ____ Boring Completed 9/22/94
Elevation Top of Rock 453.60 M.S.L. Casing Left ____
Total Rock Drilled 19.0 Feet Subsurface Water Data 453.60 Page SEE SEC. 9
Elevation Bottom of Boring 434.60 M.S.L. Obs. Well ____
Total Depth of Boring 19.0 Feet Drilled By Ma. Hawkins, C. Wheeler
Core Recovered 100 % No. Boxes 1 Mfg. Des. Drill CME-45C
Core Recovered 19 Ft : ____ Diam. ____ in. Inspected By: T. Wiggins
Soil Samples None in. Diam. ____ No. Classification By: T. Wiggins
Soil Samples ____ in. Diam. ____ No. Classification By: ____

DEPTH ft's	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
1	R-1	NXM	0.0' TO 4.0'	98%	NXM DOUBLE TUBE CORE BARREL 0.0 - 4.0'	BEDROCK: GREY GNEISS - VERT. SEAMS 48" RUN 47" REC., 3 PIECES RQD = 80% - WEATHERED TO 3.0' - QUARTZITE SEAMS
5	R-2	NXM	4.0' TO 9.0'	100%	NXM DOUBLE TUBE CORE BARREL 4.0' - 9.0'	BEDROCK: GREY GNEISS - VERT. SEAMS - QUARTZITE SEAMS 60" RUN - 60" REC. 100% RECOVERY 3 PIECES RQD = 100%
9	R-3	NXM	9.0'			BEDROCK:

GENERAL REMARKS:
7.5' WATER (BORING IN THE RIVER)

DEPTH	CORE/SAMPLE NO.	CORE/SAMPLE SIZE	CORE/SAMPLE DEPTH RANGE	BLOWS PER FT CORE RECVY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
11	R-3 Con'td	NXM			NXM DOUBLE TUBE CORE BARREL 9.0'-14.0'	BEDROCK: GREY GNEISS - JOINT. SEAMS 60" RUN - 50" REC. 3 PIECES RQD = 100%
12						
13						
14	R-4	NXM	14.0 to 19.0		NXM DOUBLE TUBE CORE BARREL 14.0 - 19.0'	BEDROCK GREY GNEISS - QUARTZITE SEAMS 60" RUN - 60" REC. 7 pieces RQD = 87%
15						
16						
17						
18					END EXPLORATION 9/22/94	
19					GROUTED BORING WITH CEMENT/BENTONITE GROUT TO SURFACE	
20						
21						
22						
23						
24						
25						
26						

11:55

NED Form 58A (Test)

Boring No. FD-C

FIG NO 2

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site TOWNSEND DAM Page 1 of 3 Pages
~~FD-94-X1~~
Boring No. ____ Desig. FD-D Diam. (Casing) 3" NW
Co-ordinates: N 201200.91 E 446036.25

Elevation Top of Boring 455.19 M.S.L.
Total Overburden Drilled 11.0 Feet
Elevation Top of Rock 444.19 M.S.L.
Total Rock Drilled 22.0 Feet
Elevation Bottom of Boring 422.19 M.S.L.
Total Depth of Boring 33.0 Feet
Core Recovered 98 % No. Boxes 2
Core Recovered 21.5 Ft : ____ Diam. 2⅛ In.
Soil Samples 3" In. Diam. 2 No.
Soil Samples ____ In. Diam. ____ No.

Hammer Wt. 300# Boring Started 9/20/94
Hammer Drop ~~28~~ 30" Boring Completed 9/20/94
Casing Left NO
Subsurface Water Data 455.19 Page SEE SEC. 9
Obs. Well NO
Drilled By M.A. HAWKINS, C. WHEELER
Mfg. Des. Drill CME-45C
Inspected By: T. WIGGINS
Classification By: T. WIGGINS
Classification By: ____

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
1	S-1		0.0 TO 2.0	9 11 28 42	3" SPOON 300# HAMMER 3" RECOVERY	CMF GRAVEL, COBBLES, TRACE CMF SAND TO 4.0' SATURATED FROM SURFACE
2						
3	S-2		2.0 TO 4.0	14 35 35 28	14" RECOVERY BROKE SAMPLER 50 BLOWS/0" @ 4.0'	
4					ROLLERBIT TO 5', SPUN NW CASING TO 5'	BOULDERS, (RIP-RAP) COBBLES, ROCK FRAGMENTS TO 11.0' (BOULDERS TO 20" Ø VOIDS TO 6" THICKNESS)
5	OB-1	NXM		56%	CORE (OVERBURDEN) 5.0' to 9.5' (NXM)	
6						
7						
8					SPUN NW CASING TO 9.5'	
9					ROLLERBIT BOULDER TO 10.5'	

GENERAL REMARKS:

ED MAR 58 (Test)

Boring No. FD-D

FIG NO 2B

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT CORE RECVY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
					ROLLER BIT TO 10.5'	BOULDER. ROCK FRAGMENTS TO 11.0'
11	R-1	NXM		83%	ADVANCED NXM DOUBLE TUBE CORE BARREL 30" INTO BEDROCK – SPUN CASING TO 13.5' (NW) SAMPLED FROM 11.0–13.5 NXM CORE	BEDROCK: 83% REC. GREY GNEISS WEATHERED TO 13.0' RQD = 82% 3 PIECES
12						
13						
14	R-2	NXM		100%	ADVANCED NXM DOUBLE TUBE CORE BARREL 4.5' SAMPLED FROM 13.5'–18.0'	100% REC. RQD = 100%, 3 PIECES GREY GNEISS
15						
16						
17						
18	R-3	NXM		100%	ADVANCED NXM DOUBLE TUBE CORE BARREL 5.0' SAMPLED FROM 18.0'–23.0'	100% REC. RQD = 100%, 4 PIECES GREY GNEISS
19						
20						
21						
22						
23	R-4	NXM		100%	ADVANCED NXM DOUBLE TUBE CORE BARREL 5.0' SAMPLED FROM 23.0'–28.0'	100% REC. RQD = 100%, 6 PIECES GREY GNEISS
24						
25						
26						

NED Form 58A (Test)

Boring No. FD-D

FIG NO 2

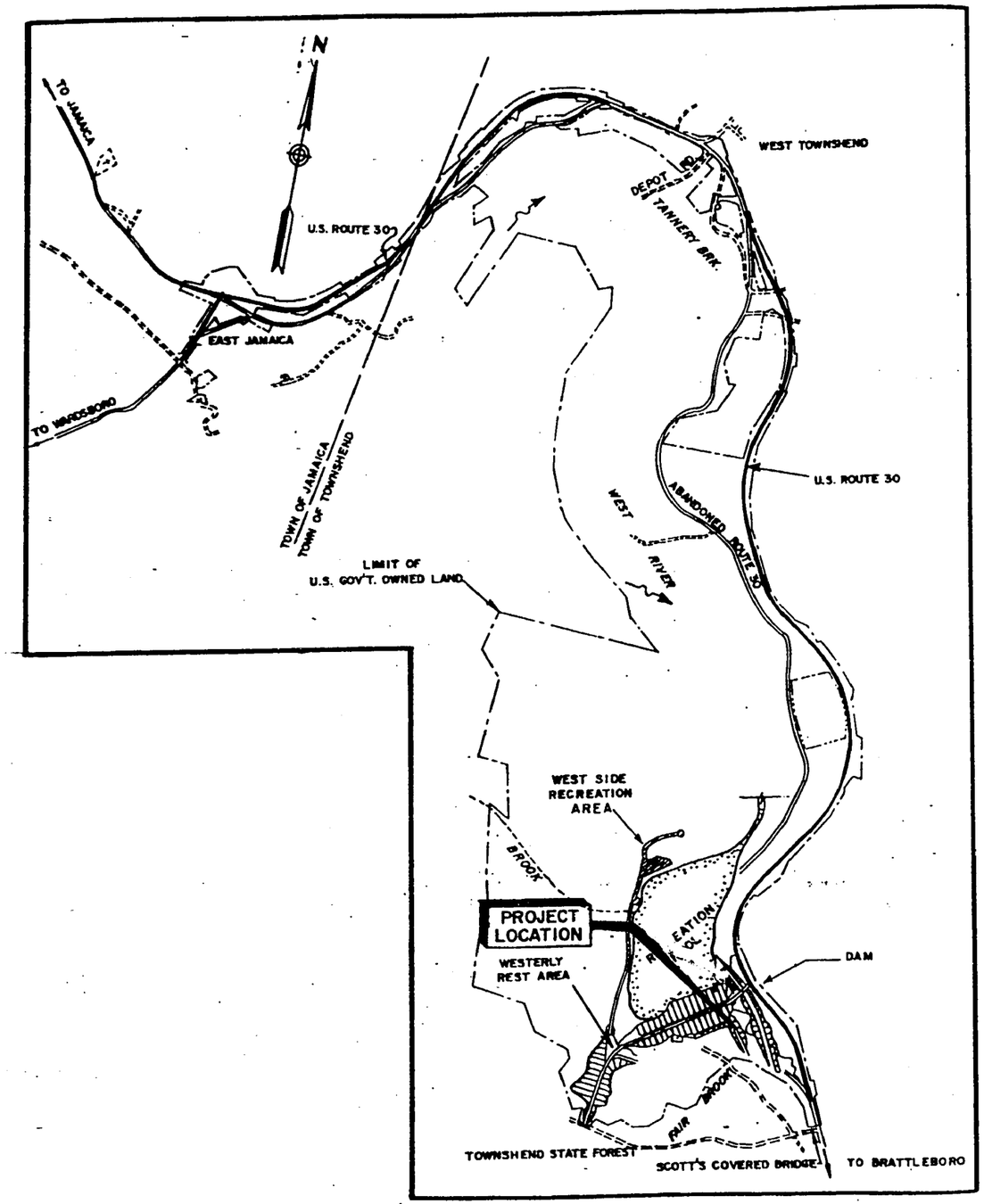
DEPTH (Ft.)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
28	R-5	NXM		100%	ADVANCED NXM DOUBLE TUBE CORE BARREL 5.0' SAMPLED FROM 28.0 - 33.0	100% RECOVERY RQD = 100%, 5 PIECES BEDROCK: GREY GNEISS - QUARTZITE SEAMS - NR. VERTICAL SEAMS
29						
30						
31						
32						
33					END EXPLORATION 9/20/94	
					GROUTED BORING WITH CEMENT/BENTONITE GROUT TO SURFACE	

NED Form 58A (Test)

Boring No. BD-D

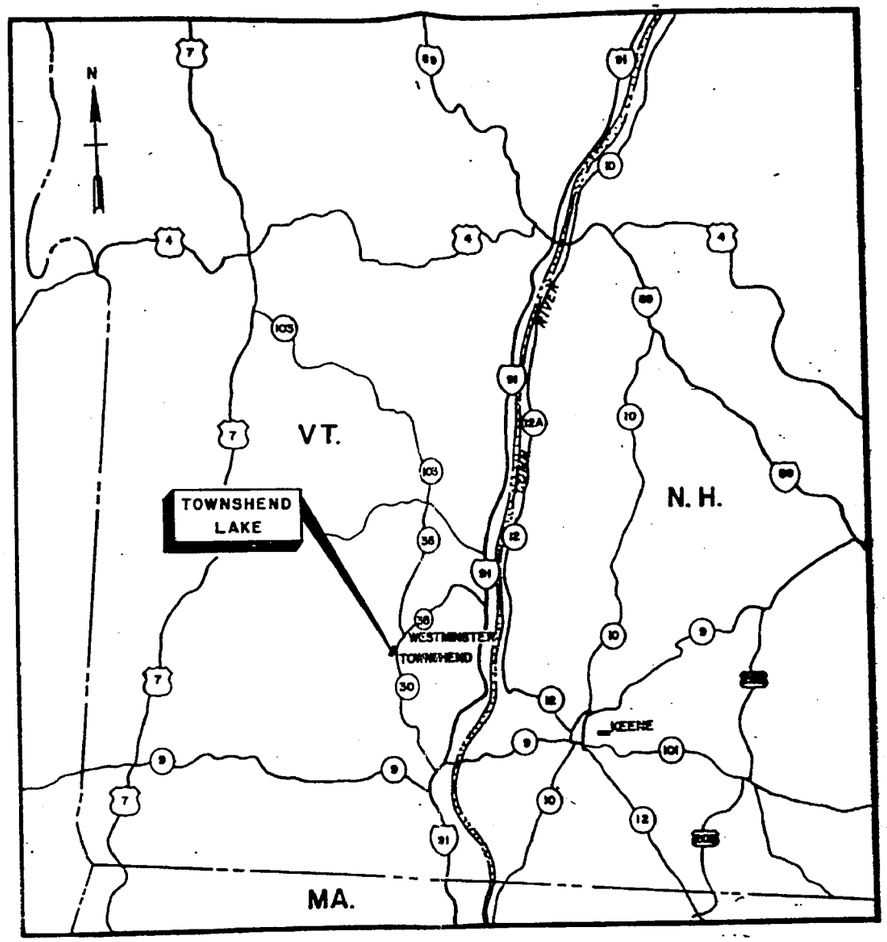
FIG NO 2

c. Figure 1 - General Project Location Map



VICINITY MAP

N.T.S.



LOCATION MAP

SCALE IN MILE

7.5 0 7.5 15 MILES

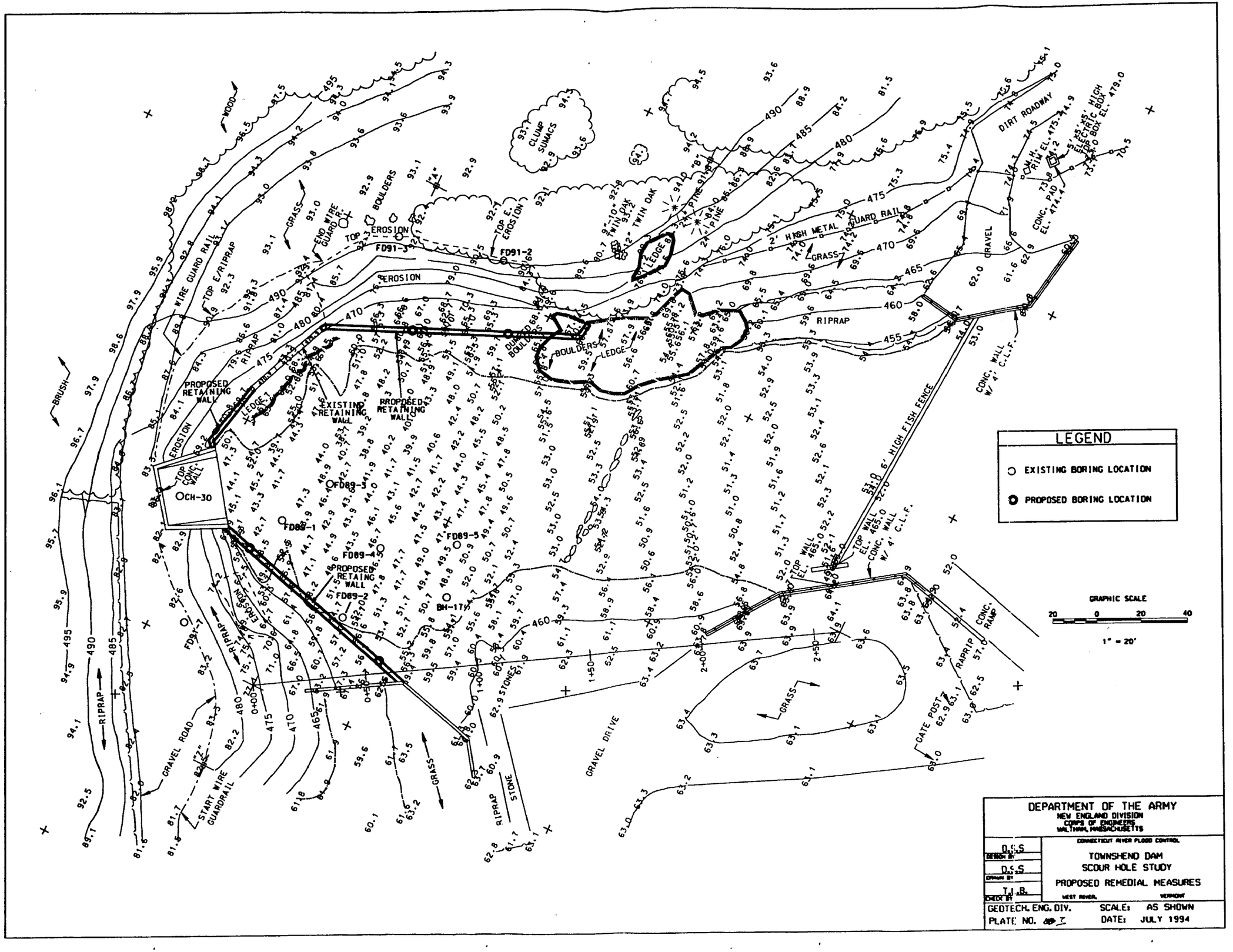
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

D.S.S. DES. BY	TOWNSHEND LAKE SCOUR HOLE STUDY LOCATION MAP
D.S.S. DR. BY	WEST RIVER TOWNSHEND, VT.
T.L.B. CK. BY	

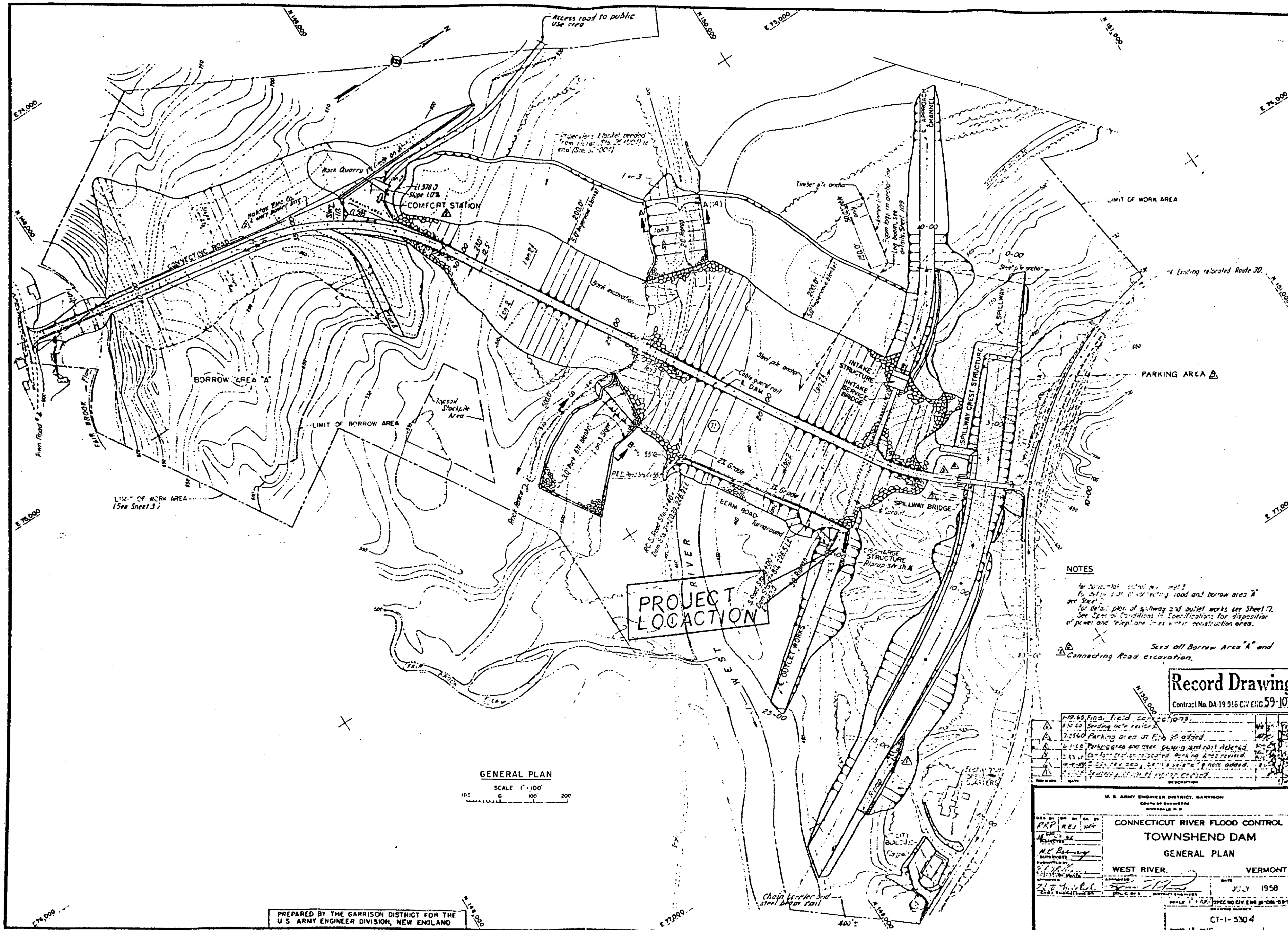
GEOTECH. ENG. BR. SCALE: AS SHOWN

SK. NO. 1 DATE:

d. Proposed Boring Locations - Plate No. 1

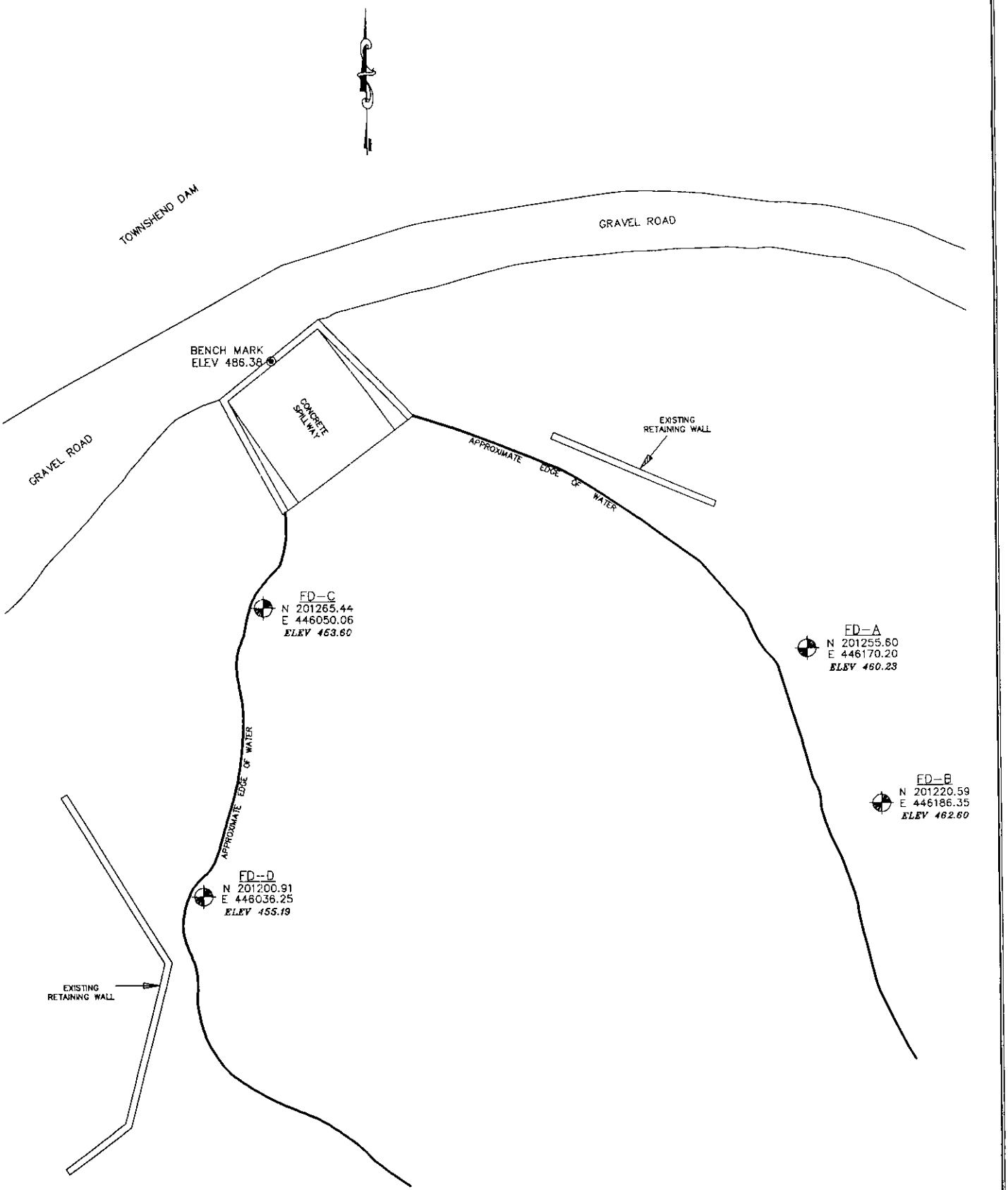

LEGEND
EXISTING BORING LOCATION
PROPOSED BORING LOCATION
GRAPHIC SCALE
20 0 20 40
1" = 20'
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS
CONNECTICUT RIVER FLOOD CONTROL
TOWNSHEND DAM
SCOUR HOLE STUDY
PROPOSED REMEDIAL MEASURES
WEST RIVER, VERMONT
GEOTECH. ENG. DIV.
SCALE: AS SHOWN
PLATE NO. 6 OF 7
DATE: JULY 1994
PROPOSED RETAINING WALL
EXISTING RETAINING WALL
TOP CONC. WALL
CH-30
FD89-1
FD89-2
FD89-3
FD89-4
FD89-5
FD91-1
FD91-2
FD91-3
BH-17
RIPRAP
GRASS
GRAVEL ROAD
GRAVEL DRIVE
DIRT ROADWAY
CONC. PAD EL. 474.4
ELECTRIC BOX EL. 473.0
CONC. WALL W/ 4' C.L.F.
6' HIGH FISH FENCE
TOP WALL EL. 465.0
2' HIGH METAL GUARD RAIL
WIRE GUARD RAIL
START WIRE GUARDRAIL
GATE POST
CONC. RAMP
RAPRIP
STONE
BOULDERS
DUMPED BOULDERS
LEDGE
TOP EROSION
TOP E/RIPRAP
END WIRE GUARD
CLUMP SUMACS
TWIN OAK
PINE
BRUSH
WOOD

e. Boring Location Plan



Access road to public use area
N 149,000
N 150,000
E 73,000
N 151,000
E 74,000
E 76,000
N 148,000
E 78,000
E 77,000
E 75,000
E 77,000
N 150,000
N 149,000
Rock Quarry
COMFORT STATION
Slope 1.0%
Halifax Elec. Co. 2 wire power line
CONNECTING ROAD
BORROW AREA "A"
LIMIT OF BORROW AREA
Topsoil Stockpile Area
LIMIT OF WORK AREA (See Sheet 3)
FAIR BROOK
Town Road #4
Bank excavation
Cable guard rail
℄ DAM
Steel pile anchor
Timber pile anchor
APPROACH CHANNEL
INTAKE STRUCTURE
INTAKE SERVICE BRIDGE
SPILLWAY CREST STRUCTURE
SPILLWAY
SPILLWAY BRIDGE
LIMIT OF WORK AREA
Existing relocated Route 30
PARKING AREA
2% Grade
3% Grade
BERM ROAD
Turnaround
DISCHARGE STRUCTURE
OUTLET WORKS
WEST RIVER
PROJECT LOCATION
Chain barrier and steel beam rail
Rock Fence
3.0' Rock fill blanket
1 on 3 Slope
1 on 2
1 on 2½
1 on 3
0-00
10-00
15-00
25-00
40-00
GENERAL PLAN
SCALE 1" = 100'
NOTES:
Seed all Borrow Area "A" and Connecting Road excavation.
Record Drawing
Contract No. DA-19-016 CIV ENG 59-103
1-19-65 Final field corrections.
Parking area at Route 30 added.
U. S. ARMY ENGINEER DISTRICT, GARRISON
CORPS OF ENGINEERS
CONNECTICUT RIVER FLOOD CONTROL
TOWNSHEND DAM
GENERAL PLAN
WEST RIVER, VERMONT
JULY 1958
CT-1-5304
PREPARED BY THE GARRISON DISTRICT FOR THE U S ARMY ENGINEER DIVISION, NEW ENGLAND

PLATE 2



BORING LOCATION PLAN

TOWNSHEND DAM
TOWNSHEND, VERMENT

DRAWN BY	SCALE	PROJECT No.	DATE
DHO	1" = 30'	CD 0047	9-30-94

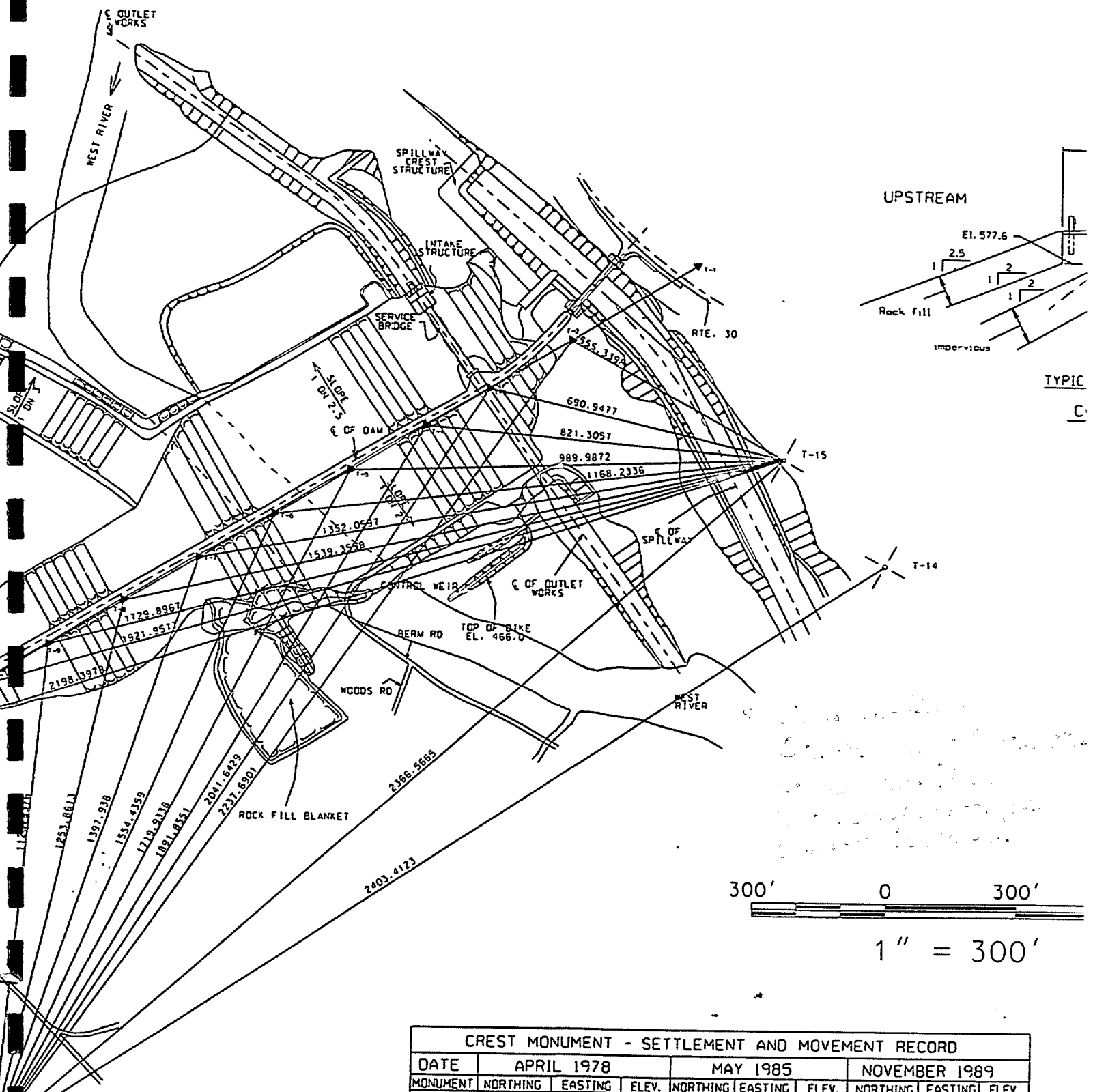
ATLANTIC TESTING LABORATORIES, Limited

CANTON, NY · CICERO, NY · ENDICOTT, NY
WILLISTON, VT · UTICA, NY · MANCHESTER, NH

SECTION 9

OTHER RECORDS TAKEN

a. Survey Notes



CREST MONUMENT - SETTLEMENT AND MOVEMENT RECORD									
DATE	APRIL 1978			MAY 1985			NOVEMBER 1989		
MONUMENT	NORTHING	EASTING	ELEV.	NORTHING	EASTING	ELEV.	NORTHING	EASTING	ELEV.
T-1	N/R	N/R	583.169	N/R	N/R	583.189	N/R	N/R	583.186
T-2	201614.466	446114.585	588.033	201614.357	446114.611	N/R	201614.39	446114.58	N/R
T-3	201502.848	445928.839	582.512	201502.881	445928.8569	582.501	201502.89	445928.86	582.488
T-4	201416.154	445783.893	582.627	201416.205	445783.9683	582.611	201416.01	445783.95	582.582
T-5	201313.764	445613.139	582.658	201313.664	445613.2398	582.654	201313.65	445613.22	582.632
T-6	201211.368	445442.420	582.954	201211.206	445442.4613	582.907	201211.18	445442.53	582.883
T-7	201109.093	445271.908	582.949	201109.958	445272.0164	582.948	201128.87	445272.07	582.947
T-8	201007.048	445101.678	582.941	201006.874	445101.8276	582.963	201226.892	445101.83	582.974
T-9	N/R	N/R	583.159	N/R	N/R	582.191	202904.46	444932.88	583.206
T-10	202302.187	444768.036	582.976	202302.032	444768.2328	583.056	202822.82	444762.21	583.099
T-11	202656.171	444516.953	588.666	202655.910	444516.4845	588.720	202655.949	444516.403	588.738
T-12	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R

N201270.807 stake w/ tack?
E446228.662

top of wall
BM Disk
El. 486.38

"Z" N201249.220
E445956.891
Top of guardrail post

PT STA 2+61.26
N201022.858
E446134.508
R.R. Spike w/ pin hole

N201200

E446000

LEGEND

- ○ EXISTING BORING LOCATION
- ◐ PROPOSED BORING LOCATION

GRAPHIC SCALE
20 0 20 40
1" = 20'

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS

CONNECTICUT RIVER FLOOD CONTROL

TOWNSHEND DAM
SCOUR HOLE STUDY
PROPOSED REMEDIAL MEASURES
WEST RIVER, VERMONT

DESIGN BY: D.C.S
DRAWN BY: D.C.S
CHECK BY: T.J.B.

GEOTECH. ENG. DIV. SCALE: AS SHOWN
PLATE NO. 3 DATE: JULY 1994

b. Water Table Data

Site: TOWNSEND DAM

Boring No: BD-A

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
9/23	11:00AM	15.0'	35.0	8.3'	451.43	Water level of River

Note: Depths are in feet below original ground

BORING LOCATION SKETCH

Site: TOWNSEND DAM

Boring No: ED-B

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
9/23/94	6:45PM	17.5'	21.5	6.2'	455.40	Water level of River
9/27/94	7:00AM	17.5'	21.5	6.9'	454.70	Water level of River

Note: Depths are in feet below original ground

BORING LOCATION SKETCH

Site: TOWNSEND DAM

Boring No: FD-C

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
9/22/44	12:00 P	0	19	Surface	~53.6	Boring Performed in Water

Note: Depths are in feet below original ground

BORING LOCATION SKETCH

FORM 59 (Test)

C-52

FIG. No. 2 D

Boring No. FD-C

Site: TOWNSHEND DAM

Boring No: FD-D

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
9:20	9:00am	13.0'	33'	Surface	458.19	Boring Performed in Water

Note: Depths are in feet below original ground

BORING LOCATION SKETCH

c. Rock Coring Data

FIELD LOG OF TEST BORING IN ROCK

SITE Townsend Dam ROLE NO. FD-A PAGE 1 of 1

DATE	DEPTH FT. FROM	DEPTH FT. TO	RUN FT.	RUN REC'V'Y FT.	REC'V'Y %	DRILLING BEHAVIOR: FEED	DRILLING BEHAVIOR: WATER	DRILLING BEHAVIOR: REASON FOR PULL	ACTUAL DRILLING TIME	BIT NO. SIZE AND TYPE	ADDITIONAL REMARKS
9/23/94	0	5.0	5.0	3.5	70	Med.	Loss of Water	5' Barrel	20 MIN	NXM Dbl. Tubelore Barrel	Overburden Sample OB-1 Cobbles, Bolders
	5.0	8.5	3.5	1.5	43	med	Loss of Water	End of Drill Rig Extension	15 MIN	NXM Dbl. Tubelore Barrel	Overburden Sample OB-2, Cobbles, Bolders
	15.5	20.0	4.5	4.5	100	med	No Loss of water	5' Barrel	18 MIN	NXM Dbl. Tubelore Barrel	Bedrock, Run1 Grey Gneiss
	20.0	25.0	5.0	5.0	100	med	No Loss of Water	5' Barrel	15 MIN	NXM Dbl. Tubelore Barrel	Bedrock, Run2 Grey Gneiss
	25.0	30.0	5.0	5.0	100	med.	No Loss of water	5' Barrel	15 MIN	NXM Dbl Tubelore Barrel	Bedrock, Run3 Grey Gneiss
	30.0	35.0	5.0	5.0	100	Med	No. Loss of Water	5' Barrel	22 MIN	NXM Dbl. Tubelore Barrel	Bedrock, Run4 Grey Gneiss

TOTAL BED ROCK DRILLED 19.5 FEET

TOTAL BED ROCK RECOVERED 19.5 FEET

BED ROCK RECOVERY 100 PERCENT

DRILLER M. Hawkins, C. Wheeler

INSPECTOR T. Wiggins

NED FORM DEC 63 #30

PREVIOUS EDITION OF APR 63 WHICH MAY BE USED UNTIL EXHAUSTED

C-56

FIG NO. (1)

FIELD LOG OF TEST BORING IN ROCK

SITE Townshend Dam ROLL NO. FD-B PAGE 1 of 1

DATE	DEPTH FT. FROM	DEPTH FT. TO	RUN FT.	RUN REC'V'Y FT.	REC'V'Y %	DRILLING BEHAVIOR: FEED	DRILLING BEHAVIOR: WATER	DRILLING BEHAVIOR: REASON FOR PULL	ACTUAL DRILLING TIME	BIT NO. SIZE AND TYPE	ADDITIONAL REMARKS
9/26/94	0.0	5.0	5.0	1.4	28%	med.	Loss of Water	5' Barrel	15 min	NXM Dbl. ~~Cor~~ Tube Core Barrel	Overburden OB-1 Cobbles, Bolders
	11.0	16.0	5.0	1.0	20	med.	Loss of Water	5' Barrel	6 min	NXM Dbl. Tube Core Barrel	Overburden OB-2 Cobbles, Bolders
	16.5	21.5	5.0	4.5	90	med.	No Loss	5' Barrel	20 min	NXM Dbl. Tube Core Barrel	❶ Run 1, Bedrock Grey Gneiss
9/27/94	21.5	26.5	5.0	5.0	100	med	No Loss	5' Barrel	15 min	NXM Dbl. Tube Core Barrel	Run 2, Bedrock Grey Gneiss
	26.5	31.5	5.0	5.0	100	med.	No Loss	5' Barrel	28 min	NXM Dbl. Tube Core Barrel	Run 3, Bedrock Grey Gneiss
	31.5	36.5	5.0	5.0	100	med.	No Loss	5' Barrel	23 min	NXM Dbl. Tube Core Barrel	Run 4, Bedrock Grey Gneiss

TOTAL BED ROCK DRILLED 20.0 FEET

TOTAL BED ROCK RECOVERED 19.5 FEET

BED ROCK RECOVERY 97.5 PERCENT

DRILLER M. Hawkings, C. Wheeler

INSPECTOR A. Brown

NED FORM DEC 63 100

PREVIOUS EDITION OF APR 63 WHICH MAY BE USED UNTIL EXHAUSTED

C-56

FIG NO. (1)

FIELD LOG OF TEST BORING IN ROCK

SITE Townshend Dam ROLE NO. FD-C PAGE 1 of 1

DATE	DEPTH FT. FROM	DEPTH FT. TO	RUN FT.	RUN REC'V'Y FT.	REC'V'Y %	DRILLING BEHAVIOR: FEED	DRILLING BEHAVIOR: WATER	DRILLING BEHAVIOR: REASON FOR POLL.	ACTUAL DRILLING TIME	BIT NO. SIZE AND TYPE	ADDITIONAL REMARKS
9/22/94	0.0	4.0	4.0'	3.9'	98	med.	No Loss	DRILLER CONVENIENCE - EVEN ROD LENGTHS	12 MIN	NXM Dbl. Tube Core Barrel	Run #1 Weathered Rock to 3.0', Grey GNEISS
	4.0	9.0	5.0	5.0	100	med.	No Loss	5' Barrel	15 MIN	NXM Dbl. Tube Core Barrel	Run #2 Grey GNEISS -Vert. Seams, Quartzite Seams
	9.0	14.0	5.0	5.0	100	med.	No Loss	5' Barrel	17 MIN	NXM Dbl. Tube core Barrel	Run #3 Grey GNEISS Vert. Seams
	14.0	19.0	5.0	5.0	100	med.	No Loss	5' Barrel	15 MIN	NXM Dbl Tube Core Barrel	Run #4 Grey GNEISS

TOTAL BED ROCK DRILLED 18.19.0 FEET

TOTAL BED ROCK RECOVERED 18.9 FEET

BED ROCK RECOVERY 99 PERCENT

DRILLER M. Hawkins, C. Wheeler

INSPECTOR T. Wiggins

MED FORM DEC 63 130

PREVIOUS EDITION OF APR 62 WHICH MAY BE USED UNTIL EXHAUSTED

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FIG NO. 6

FIELD LOG OF TEST BORING IN ROCK

SITE Townsend Dam HOLE NO. FD-D PAGE 1 of 1

DATE	DEPTH FT. FROM	DEPTH FT. TO	RUN FT.	RUN REC'V'Y FT.	REC'V'Y %	DRILLING BEHAVIOR: FEED	DRILLING BEHAVIOR: WATER	DRILLING BEHAVIOR: REASON FOR PULL	ACTUAL DRILLING TIME	BIT NO. SIZE AND TYPE	ADDITIONAL REMARKS
9/20/94	11.0	13.5	2.5	2.1	83	medium	No Water Loss	5' Barrel	15 min	NXM Double Tube Core Barrel	Run #1 Weathered Rock to 13', Grey Gneiss
9/20/94	13.5	18.0	4.5	4.5	100	medium	No Water Loss	5' Barrel	11 min	NXM Double Tube Core Barrel	Run #2 Grey Gneiss
9/20/94	18.0	23.0	5.0	5.0	100	Medium	No Water Loss	5' Barrel	15 min	NXM Double Tube Core Barrel	Run #3 Grey Gneiss
9/20/94	23.0	28.0	5.0	5.0	100	Medium	No Water Loss	5' Barrel	15min	NXM Double Tube Core Barrel	Run #4 Grey Gneiss
9/20/94	28.0	33.0	5.0	5.0	100	Medium	No Water Loss	5' Barrel	15min	NXM Double Tube Core Barrel	Run #5 Grey Gneiss Quartzite Seams

TOTAL BED ROCK DRILLED 22 FEET

TOTAL BED ROCK RECOVERED 21.5 FEET

BED ROCK RECOVERY 98 PERCENT

DRILLER M. Hawkins/C. Wheeler

INSPECTOR T. Wiggins

NED FORM DEC 63 130

PREVIOUS EDITION OF APR 63 WHICH MAY BE USED UNTIL EXHAUSTED

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FIG NO (1)

d. Field Log of Test Boring

CORPS OF ENGINEERS, U. S. ARMY
NEW ENGLAND DIVISION
FOUNDATION AND MATERIALS BRANCH

FIELD LOG OF TEST BORING

PROJECT NO. _____

Site TOWNSEND DAM — Page 1 of ___ Pages

Hole No. ED-A Diam. (Casing) 3" — Boring Started 9/22/94

Co-ordinates: N 201255.60 E 446170.20 — Boring Completed 9/23/94

Drilled by M. Hawkins, C. Wheeler — Report Submitted _____

Purpose of Exploration To Define charakter of subsurface materials in the outlet scour hole

Elevation Top of Hole 460.23 M.S.L. — Casing Left in Place 0 Feet

Total Overburden Drilled 15 Feet

Elevation Top of Rock 445.23 M.S.L.

Elevation Bottom of Hole 425.23 M.S.L.

Total Rock Drilled ~~20.0~~ 20.0 Feet — TOTAL RIP-RAP DRILLED 15.0 FEET

Total Depth of Hole 35.0 Feet

Core Recovered 100 %

Core Recovered 19.5 Ft.: ____ Diam. 2⅛ In.

Soil Samples _____ In. Diam. ____ No.

Soil Samples _____ In. Diam. ____ No. — Water Table Depth 8.8' (induced)

Depth From	Depth To	Method of Drilling and Type of Bit Used
0	8.5	NXM Double Tube Core Barrel
0	15.5	NW casing
15.5	35.0	NXM Double Tube Core Barrel

INDEX

Prepared by T. Wiggins — Field Data — Lab. Data

Submitted by _____

NED FORM DEC 63 121 — REPLACES EDITION OF JUN 51 WHICH MAY BE USED UNTIL EXHAUSTED

FIG NO 2

CORPS OF ENGINEERS, U. S. ARMY
NEW ENGLAND DIVISION
FOUNDATION AND MATERIALS BRANCH

FIELD LOG OF TEST BORING

PROJECT NO. _____

Site Townshend Dam — Page 1 of 1 Pages

Hole No. FD-B Diam. (Casing) 3" — Boring Started 9/26/94

Co-ordinates: N 201220.59 E 446186.35 — Boring Completed 9/27/94

Drilled by M. Hawkins, C. Wheeler — Report Submitted _____

Purpose of Exploration To define character of subsurface materials in the outlet scour hole.

Elevation Top of Hole 462.60 M.S.L. — Casing Left in Place 0 Feet

Total Overburden Drilled 16.5 Feet

Elevation Top of Rock 446.10 M.S.L.

Elevation Bottom of Hole 426.10 M.S.L.

Total Rock Drilled 20 Feet — TOTAL RIP-RAP DRILLED 16.5 FEET

Total Depth of Hole 36.5 Feet

Core Recovered 97.5 %

Core Recovered 19.5 Ft.; ____ Diam. 2 1/2 In.

Soil Samples _____ In. Diam. ____ No.

Soil Samples _____ In. Diam. ____ No. — Water Table Depth 6.8' (induced)

Depth From	Depth To	Method of Drilling and Type of Bit Used
0	5.0	NXM Double Tube Core Barrel
11.0	16.0	NXM Double Tube Core Barrel
16.5	36.5	NXM Double Tube Core Barrel
0	17	NW Casing

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Ground Water _____ Back of Page ____

Boring Location Sketch _____ Back of Page ____

Overburden Record _____ Page ____

Rock Drilling _____ Page ____

_____ Page ____

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_____ Page ____

Prepared by A. Brown — Field Data — Lab. Data

Submitted by _____

NED FORM DEC 63 121 — REPLACES EDITION OF JUN 51 WHICH MAY BE USED UNTIL EXHAUSTED

FIG NO 2

CORPS OF ENGINEERS, U. S. ARMY
NEW ENGLAND DIVISION
FOUNDATION AND MATERIALS BRANCH

FIELD LOG OF TEST BORING

PROJECT NO. _____

Site TOWNSEND DAM — Page 1 of ___ Pages

Hole No. FD-C Diam. (Casing) 3" — Boring Started 9/22/94

Co-ordinates: N 201565.44 E 446050.06 — Boring Completed 9/22/94

Drilled by M. Hawkins, C. Wheeler — Report Submitted _____

Purpose of Exploration To Define character of subsurface materials in the outlet scour hole

Elevation Top of Hole 453.60 M.S.L. — Casing Left in Place 0 Feet

Total Overburden Drilled 0 Feet

Elevation Top of Rock 453.60 M.S.L.

Elevation Bottom of Hole 434.60 M.S.L.

Total Rock Drilled 19 Feet — TOTAL RIP-RAP DRILLED Ø FEET

Total Depth of Hole 19 Feet

Core Recovered 99 %

Core Recovered 18.9 Ft.: ____ Diam. 2⅛ In.

Soil Samples None In. Diam. ____ No.

Soil Samples _____ In. Diam. ____ No. — Water Table Depth 0 (in River)

Depth From	Depth To	Method of Drilling and Type of Bit Used
0	19	NXM Double Tube Core Barrel

INDEX

Prepared by T. Wiggins — Field Data — Lab. Data

Submitted by _____

MED FORM DEC 63 121 — REPLACES EDITION OF JUN 51 WHICH MAY BE USED UNTIL EXHAUSTED

FIG NO 2

CORPS OF ENGINEERS, U. S. ARMY
NEW ENGLAND DIVISION
FOUNDATION AND MATERIALS BRANCH

FIELD LOG OF TEST BORING

PROJECT NO. _____

Site Townshend Dam — Page 1 of ___ Pages

Hole No. FD-D Diam. (Casing) 3" — Boring Started 9/20/94

Co-ordinates: N 201200.91 E 446036.25 — Boring Completed 9/20/94

Drilled by M. Hawkins, C. Wheeler — Report Submitted _____

Purpose of Exploration To Define charater of Subsurface Materials in the Scour Hole

Elevation Top of Hole 455.19 M.S.L. — Casing Left in Place 0 Feet

Total Overburden Drilled 11 Feet

Elevation Top of Rock 444.19 M.S.L.

Elevation Bottom of Hole 422.19 M.S.L.

Total Rock Drilled 22' Feet — TOTAL RIP-RAP DRILLED 7.0 FEET

Total Depth of Hole 33' Feet

Core Recovered 98 %

Core Recovered 21.5 ft.: ___ Diam. 2 1/8 in.

Soil Samples 3" in. Diam. 2 No.

Soil Samples _____ in. Diam. ___ No. — Water Table Depth 0 (in River)

Depth From	Depth To	Method of Drilling and Type of Bit Used
0	4	3" Diam. Split Spoon
0	13.5	NW casing
5	33	NXM Double Tube Core Barrel

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Prepared by T. Wiggins — Field Data — Lab. Data

Submitted by _____

NED FORM DEC 63 121 — REPLACES EDITION OF JUN 51 WHICH MAY BE USED UNTIL EXHAUSTED

FIG NO 2